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Captain James Cook and the Sandwich Islands . . Sir Henry Newbolt 97
Captain Cook and the Founding of British Power in the Pacific . Professor J. Holland Rose 102
Cook as an Hydrographical Surveyor . . Rear-Admiral H. P. Douglas 110
Captain Cook as an Astronomer . . . . . Sir Frank Dyson 117
An Expedition to the Cockscomb Mountains, British Honduras, in March 1928 J. N. Oliphant and Duncan Stevenson 123
A Second Cockscombs Expedition in 1928 . . . Herbert T. Grant 138
A Ski Ascent of the Shickshocks . . . . Captain B. J. Marden 145
A Second Journey among the Southern Tuareg; Notes on Scientific Results F. Rodd, P. Rodd and A. Courtauld 147
Irish Archaeology: Review . . . . . E. L. 159
Reviews The Monthly Record Obituary Meetings
Society Notices iii
Contents v

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Born 27 Oct. 1728 Killed at Kealakekua, Hawaii, 14 Feb. 1779

From the engraving by Bartolozzi in the collection of the Society, after the portrait painted by John Webber at the Cape, and now in the National Portrait Gallery

The
GEOGRAPHICAL JOURNAL

Vol LXXIII No 2 R.G.S. *February 1929*

CAPTAIN JAMES COOK AND THE SANDWICH ISLANDS:

A paper contributed to the Celebrations at Honolulu in August 1928, and read by Admiral Sir William Goodenough, K.C.B., at the Evening Meeting of the Society on 17 December 1928, in the absence of the author, the official British Naval Historian

SIR HENRY NEWBOLT, C.H., D.LITT.

OUR celebration to-day has a threefold interest. The discovery of the Sandwich Islands is an event of unique importance in the story of the Hawaiians, and an incident of a typical and significant kind in the history of England; it is also the earliest recorded event in the history of what is now an organized territory of the United States of America. It is fortunate that the date of this event is not a subject of legend or of reasonable doubt; it is exactly known and still fresh in our historical recollection. We may imagine it not impossible that in the misty earlier centuries the outline of a great volcano may have been sighted by a sailor on the mast of some wandering ship—Spanish perhaps or Portuguese—but no explorer has left record or evidence of any such experience. The recorded history of Hawaii begins on 18 January 1778, when Captain James Cook in the *Resolution* sighted the archipelago which he afterwards plotted as the Sandwich Islands upon the first authentic maps of the Pacific. And it is even more important to note that, by the friendly overtures begun two days later, he may be said to have delivered to the inhabitants the first invitation they had yet received to enter the world fellowship of nations.

In the 150 years which have since elapsed the Hawaiians have passed rapidly, but by stages of the kind familiar to historians, from a feudal to a republican form of government, and they are now included in a vast Commonwealth not unlike our own. A British onlooker cannot but remember that for his own people a similar insularity of position, an equal diversity of immigrant populations, and a parallel trend of political development have been favourable to a long and successful evolution; he will find it natural to sympathize with the rising hopes of another island race, while he looks back with pride to the discovery and the discoverer whose memory we are now honouring.

The life of James Cook is indeed one worth considering, for the sake not of the past only but of the future. Here is a man who, though born 200 years ago, stands before us to-day not as a seaman of an obsolete type, nor as a hero

of forgotten wars: his career is still an example and a corrective for coming generations. It proves that high birth, elaborate schooling, or great opportunities are not the sovran causes of distinction; and, on the other hand, it effectually discredits the flattering doctrine that all men are born equal. In person, in ability, and in character Cook surpassed most of his contemporaries of all ranks, and the only advantages or opportunities he enjoyed were those offered to him by his country in the successive grades of her marine service. His achievements brought him little but honour and a continually extended sphere of activity; his life was spent in exacting work, and, for the most part, in the long exile of the sea; his happiness he must have found mainly in the mastery with which every stage of his service was performed. That mastery and the ever-widening application of it seem to have left him no cause for discontent, no time for ambition; we hear of only one moment when life went less than well with him, and that was when he was crossing the threshold of childhood. His father, a Yorkshire farm labourer, had taken him from the village school and from his first occupation of crow scaring in the fields, and had apprenticed him to a shop-keeper in the neighbouring coast town of Staithes. It is probable that as he looked out from that remote shore and saw the ships passing to their business in the North Sea or beyond it, he may for once in his life have felt discontent stirring: certainly he heard adventure calling to him. Some kind of crisis occurred. He left Staithes and was handed over to a firm of shipowners at Whitby, with whom he served for years in the Newcastle, Norway, and Baltic trades.

He was nearly 27 in 1755 when English and French colonists were coming to blows in North America. The ship of which he was mate was lying in the Thames. The press gang were actively recruiting for the navy. Disdaining to be taken by force he volunteered for the King's service and was shipped as able seaman in the *Eagle* 60-gun ship with Captain Hugh Palliser, who was not long in discovering his merits. By 1759 Cook had been promoted master and was sent to the St. Lawrence to carry out the vitally important work of surveying the river and piloting Admiral Saunders's fleet before Quebec. This was done with such courage and accuracy that when the admiral returned to England, Lord Colville, who succeeded him, made Cook master of his flagship, the *Northumberland*. The winter of 1760 was passed at Halifax, where Cook spent his time in studying mathematics and astronomical navigation. In 1763 his old captain, Palliser, by this time Governor of Newfoundland, appointed him Marine Surveyor of Newfoundland and Labrador. He was now, by his own exertions, a man of education and ripe abilities, able to publish during his occasional visits to England the volumes of 'Sailing Directions' which made him the standard authority on navigation. At the same time he began to acquire a reputation as an astronomer and mathematician; in 1766 he was sent to the Burgo Islands, near Cape Ray, to observe a solar eclipse, and two years later, at the instance of the Royal Society, he was commissioned by the Admiralty as lieutenant in command of the *Endeavour* to convey to Tahiti an expedition for observing the transit of Venus. On the homeward voyage he spent six months on the coast of New Zealand, which he completely examined and charted for the first time; he then surveyed the whole east coast of Australia, and by the exploration of

Endeavour Straits proved that New Guinea was not an outlying part of the island continent. This was acclaimed as in every way a successful and creditable voyage; but the one fact which was impressed by it on Cook's own mind was that out of his eighty-five men he had lost no fewer than thirty from scurvy and other diseases incidental to prolonged service at sea. In face of such a fact neither his scientific mind nor his humane temperament could allow him to remain content with his own success.

He had not to wait long before trying the effect of a new method. Only two months after his return to England he was promoted to the rank of commander in the navy and put in charge of a new expedition to explore the Pacific. In July 1772 he sailed in the *Resolution* of 460 tons accompanied by the *Adventure* of 330 tons, Captain Furneaux, and taking with him as before a number of astronomers, naturalists, and artists. This second voyage was more dramatic and hazardous in its incidents than the previous one. The two ships, after passing the Cape, entered the Antarctic Circle on 16 January 1773, and on February 8 became separated in a dense fog. The *Resolution* made her way to New Zealand after sailing 4000 leagues without seeing land. Thence she went on to Queen Charlotte's Sound, where she was fortunate enough to fall in with her consort, and the two ships sailed together to Tahiti, where they separated intentionally. The *Adventure* left for home, while the *Resolution* made a final attempt to verify the existence of the legendary Antarctic Continent to the south of Cape Horn and the Atlantic. In the course of this last sweep, after being a hundred and four days out of sight of land, Commander Cook visited Easter Island and the New Hebrides, discovered New Caledonia, Norfolk Island, and the Isle of Pines, discovered or rediscovered Southern Georgia, and some days later sighted Sandwich Land. He reached home on 29 July 1775 and found that the *Adventure* had arrived a year before him.

This was a voyage rich in discoveries of more than one kind. Over and above the new lands found and named, the disproof of the supposed continent's existence was of real value as a contribution to accurate charting, and Professor J. K. Laughton has summed up the results, positive and negative, in a single curt sentence: "Maps of those parts remain essentially as Cook left them." The finality so often characteristic of Cook's work was also reached on this voyage in another line of exploration—a search more urgent and more immediately repaying than any territorial discovery. His first expedition had cost him, as we have seen, the lives of more than one-third of his men; this second voyage had been longer and far more testing, but of the 118 who sailed with him only one lost his life through sickness. He had found out how men could keep the sea and live.

The honours paid to Cook upon his return were unique, for they were the recognition of two services, carried out in a manner hitherto unknown, as it were, by two men in one: the first a sea officer who had risen from the lowest rank, the second a scientist who had discovered his scientific methods for himself, in the course of other duties. Ten days after reaching Plymouth he was posted captain in the navy, a rank seldom attained before or since by a lower-deck man, and never as the reward of such a career. Shortly afterwards he was elected to the Royal Society, and at the meeting at which he read before

the Society an account of his recent voyage he was awarded the Copley Gold Medal for his explorations and discoveries.

An appointment at Greenwich was also offered to him; but this meant retirement, and he was not yet 47, a strong man in the prime of life. He felt, as we are told Ulysses felt in his last years, that some work of noble note might yet be done, even though it should take him beyond the sunset. An expedition was being fitted out to search for the North-West Passage; Captain Cook offered his services; they were, of course, accepted. On 12 July 1776 he left England for the last time in the *Resolution*, followed on August 1 by Captain Clarke in the *Discovery*. The two ships joined at the Cape, and sailed in company to Van Diemen's Land and New Zealand. After this Captain Cook spent a whole year in a further exploration of the Pacific, where he discovered two more groups of islands—the Cook Islands and the Hervey Islands. Towards the end of 1777 he sailed from Tahiti for the West Coast of America, and on 18 January 1778 came for the first time in sight of the archipelago which he named the Sandwich Islands. The natives were friendly and spoke the language of Tahiti, which he could understand. After a short stay he sailed north as far as Icy Cape, discovering King George's Sound and Prince William's Sound. Finally, he came south again to the Sandwich Islands and dropped anchor in Kealakekua Bay on 17 January 1779. Here he stayed for a fortnight, during which time he was on excellent terms with the King and priests of Hawaii, though he suffered from the eagerness of chiefs and people to acquire all objects made of iron—they even abstracted under water the nails which secured the ship's timbers. At last he suspected that he was outstaying his welcome; on February 4 he said good-bye and put to sea. Bad weather came on: the *Resolution* sprung her foremast, and on the 11th he was forced to return to his anchorage for repairs. He found a changed people with whom it was no longer easy to maintain good relations.

The great captain was now doomed; he was in the net which is apt to entangle the man of action who is also a man of feeling. His ship was invaded by thieves from the shore; he demanded their surrender and showed force, but he was too humane to make a *casus belli* out of the loss of an armourer's tongs. The *Discovery's* cutter was then stolen by night, and this was a serious matter. He went ashore next morning to see the King, whom he invited to come aboard and guarantee him against further lawlessness. The King appeared to consent, but was afterwards overpersuaded by his family; to avoid a conflict Captain Cook retired, but the conflict was forced upon him before he could re-embark. Four marines were killed and three wounded as they attempted to get off to the boats, and in the confusion Captain Cook himself, staying till last, was left alone by the waterside. One boat's crew obeyed his call to close the shore, but he had given the order to cease firing, and they saw him struck down and stabbed by many knives without being able to save him.

So died the greatest of our explorers, before he had yet come near the natural term of his life. But he cannot be said to have been robbed of his full portion either of activity or of happiness. He had signally served his country and mankind by the exercise of great powers over a rounded period of years, he had gathered honours and friendships, and achieved the foremost place among those who have helped to draw the true outlines of the habitable earth.

The monument to Captain Cook erected by Sir Hugh Palliser at The Vache Chalfont St. Giles

TO THE MEMORY OF
CAPTAIN JAMES COOK.
The ableſt and moſt renowned
Navigator this or any country
hath produced.
He raiſed himſelf ſolely by his merit
from a very obſcure birth to the rank
of Poſt Captain in the Royal navy and
was unfortunately killed by the Savages
of the iſland Owhyhee on the 14 of February
1779 which iſland he had not long before
diſcovered when proſecuting his third
voyage round the globe.
He poſſeſſed in an eminent degree all the

The first part of the inscription

We may perhaps add one more word to his praise. In the lands with which his life and fame were most closely bound up, in England, in Australia, and in Hawaii, there have been since his time great changes of a kind that he could not foresee. But human life, though it must be for ever voyaging through strange seas, may still be helped by sailing directions compiled from the experience of navigators past and gone. In this sense, as in the other, James Cook was a great navigator, and the secret of his own method is one worth considering in the new age upon which we entered so suddenly ten years ago. The trend of the oncoming generation is not a matter for our criticism—they will take and bear their own responsibilities—but the opportunity of making observations on such a life as Cook's is theirs as well as ours. One possible observation may be suggested here and now. The sailing directions at present most in vogue are headed "Independence" and "Originality." Spirited as these sound it is open to doubt whether they are so invariably useful, or indeed so practicable, as they are often considered. At any rate it may be noted that Cook's lifelong method was a different one. For independence, which for him as for most men was hardly possible, he substituted a free and honourable acceptance of service. In place of originality, which cannot be had by striving after it, he set before himself a distinction which is quite as rare; he aimed at perfection in all that he undertook. By so doing he avoided much of the friction and loss which hinder the independent and original, and achieved a rhythm or harmony which continually strengthened both himself and those who worked with him. Nor can any one say that his life was the tamer or less glorious for this harmony; it was greatly daring, and greatly enduring; it was as stirring as the heroic names of his ships—*Endeavour*, *Resolution*, *Adventure*, and *Discovery*.

CAPTAIN COOK AND THE FOUNDING OF BRITISH POWER IN THE PACIFIC: *A paper read at the Evening Meeting of the Society on 17 December 1928 by*

PROFESSOR J. HOLLAND ROSE, LITT.D.

IT is the weakness of bi-centenary or centenary celebrations that they tend to concentrate attention too exclusively on the man whose memory is then commemorated, and to leave out of count other influences, both national and personal, which brought him into prominence and moulded his career. The purpose of such celebrations is altogether praiseworthy, but they lend themselves to the exaggeration which nearly always accompanies hero-worship. It is well, then, that such occasions should be followed by what may be termed a process of readjustment, in which other persons and contributory influences recover their due importance. Coming as I do from a University which is well known for its lofty aloofness from the topical and transitory, and its scientific devotion to the universal and the eternal, I hope that I shall be pardoned if I shake off the bi-centenary spirit and try to cultivate the historical spirit. In other words, may I seek, not to sing once more the praises of Captain Cook (for that is surely needless), but rather to show his relation to the ideas of his age, and then briefly to set forth his connection with the men who came before and after him? Fortunately, there have of late appeared documents which help us in this task of trying to correlate him with the thought and the work of his age.

First, we are confronted by the question: What motive was it which impelled the British Admiralty to send out Cook on those three long voyages? Was it that My Lords were suddenly seized by the spirit of geographical curiosity? Did the longing to tear aside the veil of mystery, which for ages had hung over the southern tracts of the great Southern Ocean, now invade the precincts of Whitehall? Or did other more mundane considerations prompt their action in sending out the *Endeavour* and the *Resolution*?

Before we answer this question in detail, let us try to realize the conceptions of an Antarctic World prevalent in that age; and then seek also to understand the political situation which doubtless contributed towards framing the new Pacific policy of the Admiralty.

For ages the minds of men had been haunted by the idea that there was a great world to the southward. How that idea first took form, and how it thereafter grew in extent and in mystery, would form a long and obscure story. It would delve back into the age of the Greek legends about 350 B.C. when the sage Theopompos declared that in the southern parts of our sphere there must be a great continent so as to balance our northern land mass and keep the sphere steady. Then came other thinkers, less fanciful, less prone to people that southern space with giants inhabiting mighty cities, and more scientific in their way of thought. Finally, the great geographer Ptolemy (*circ.* 140 A.D.) imagined in the southern half of the world a great tract of land, *Terra incognita*, which seems to imply an eastern extension of S. Africa and a bend far north to join a southern extension of China. Thus for him the South Sea seems to have been a closed sea.

The Middle Ages long rejected all thoughts of a spherical world; and Pope after Pope banned the idea of the Antipodes as heretical. Nevertheless, all

through those ages the Malays were voyaging farther and farther south and almost certainly fished on the shores of a land which must be Australia. It was reserved for that enterprising Venetian voyager, Marco Polo, during his long wanderings in the East, to unveil this strange new world to the men of Europe; and he told them of the Isles, Java Minor and Java Major, the latter being the greatest island of the world.

Thus Marco Polo, whose glowing accounts of Cipango (Chipangu) turned men's thoughts towards the western quest which finally led to the discovery of America, also directed their gaze wonderingly towards a great island of the South Sea. And it is one of the curiosities of geographical nomenclature that this enterprising Venetian, who was the *primum mobile* of the greatest deeds of discovery, has left his name on neither of the continents whose discovery was due primarily to his inquisitive brain.

After this great Venetian came the Spanish discoverers of the Southern Ocean, Magellan, de Quiros, and Torres. Magellan showed that there was a sea-way into the great South Sea; and, while in the straits named after him, he named the land (really a group of islands) to the southward Tierra del Fuego, which for a time confirmed the prevalent belief in a great Antarctic Land almost separating the Atlantic from the South Sea. Such continued to be the general belief until in 1579 Francis Drake, driven back southwards from near the western mouth of that strait by a terrible storm, proved that to the south of those islands stretched an open sea. His chaplain, Master Francis Fletcher, thereupon named the neighbouring land "*Terra australis nunc bene cognita*"; and in his Journal he stated that "the Atlantic Ocean and the South Sea meete in a most large and free scope." These were epoch-marking discoveries. Magellan's voyage and that of Drake proved that the South Sea was no closed expanse but one that was open both to the Atlantic and the Indian Oceans. Later, in 1616, the Dutch captains, Schouten and Le Maire, doubled Cape Horn and again proved the South Sea to be connected with the Atlantic, just as Bartolommeo Diaz in 1487 had proved that the Indian Ocean merged broadly into the Atlantic. The inquiries of geographers, with the voyages of Diaz, Magellan, Drake, and Schouten, served to disprove the old Ptolemaic notion of a closed-in South Sea. It was absurd to claim ownership of a vast open ocean. Yet that claim (derived from the old papal partition of 1493) was upheld by Spain with extraordinary persistence. True, Spaniards had done very much to discover parts of its shores, not only along South America and as far north as California, but also the northern parts of Australia; for de Quiros and Torres were probably the first white men to sight the northern parts of that Isle of Continent. Still, the Spanish claim to control a vast ocean, which was part of the world-ocean, could not be substantiated.

Contemporary with Torres, who in 1606 made his way through his Strait, came the Dutch—then in the heyday of their wonderful expansion. Tasman and many others of their bold seamen pushed from Java far into the West and South-West Pacific. But none of them solved the problem of *Terra australis incognita*, though Tasman came near to a solution when he sighted first Tasmania and, later, New Zealand. The Dutch, however, were a very practical people, whose chief interest was in spices, a trade which often yielded 400 per cent. profit. Therefore they paid little attention to non-tropical lands,

and confined their attention to the Spiceries. Not until 1721 did one of their voyagers, Roggeveen, round the Horn in the search for the great South Land, famed for its wealth in gold; and it is significant that in the midst of an apparently fruitless quest his crew compelled him to desist and make for the tropics, where he discovered Samoa.* The voyage of a Frenchman, Bouvet, in 1739 was equally fruitless; and, as Commodore Anson's voyage to the Pacific (1740–44) was chiefly for the purpose of plundering Spanish settlements, he too added nothing to the meagre stock of knowledge of *Terra australis incognita*. Yet it is certain that his voyage of circumnavigation, and the plunder which he brought home, aroused a keen interest in the South Sea.

So great was the interest in that sea that in 1745 (a year of war and of Prince Charles's romantic attempt to oust George II) Parliament felt sure enough of the future to pass an Act whereby any British subject in a British ship who should "find out and sail through any passage between Hudson Bay" and the South Sea, should receive a reward of £20,000.† The reward was offered, not perhaps as a Westminster hoax, but as a means of clearing up a pretty quarrel between an opinionated Mr. Dobbs (afterwards Governor of South Carolina) and Captain Middleton, R.N. The latter had been out with a ship to Hudson Bay to find such a channel and returned with the news that there was none. Dobbs (though he had never been out there) was sure there *was* one, and quizzed Middleton and the Hudson's Bay Co. unmercifully for maintaining there was not.‡ Apparently Parliament took the side of Middleton and the Company, and felt on sure ground when they made that generous offer.

The Seven Years' War intervening, nothing was done until after 1763; but we may note that, in the first year of that war, a Frenchman, De Brosses, compiled a history of all attempts to reach *les Terres Australes*.§ In it he sought to incite French seamen to find this unknown continent in which there might be great riches.

When Great Britain emerged from the Seven Years' War triumphant over France and Spain, she was obviously best fitted to pursue the exploration of the South Sea. But the voyage of Captain the Hon. John Byron (grandfather of the poet) was singular in this respect, that after passing the Straits of Magellan he sailed right across the Pacific Ocean to the I. of Tinian without sighting land except a few coral reefs and islets.‖ His successor, Captain Wallis, in 1766–7 discovered Tahiti, to which he gave the name of George III Island. After that he effected nothing of importance, and reached home in May 1768. His comrade, Carteret, in the *Swallow*, found the I. of Juan Fernandez no longer desolate, but occupied and fortified by the Spaniards ‖

This was a find of the utmost importance, and I believe that the news clinched the resolve of the Admiralty to go on and open up the Pacific. For Juan Fernandez had, from the time of Dampier, been the chief resort of English and other interlopers venturing into that ocean. In that delightful island, which Defoe's pen by no means overcoloured, a ship's crew could

*Mill, Hugh R., 'The Siege of the South Pole,' p. 45.
†Anderson, 'Origin of Commerce,' III, 246.
‡*Ibid.*, 233–40.
§De Brosses, 'Hist. des Navigations aux Terres australes' (1756).
‖Clowes, L., 'Hist of Royal Navy,' IV, 119–21.

rest and find refreshment after the months of tossing off Cape Horn and the coast of South America. For the Spaniards to fortify and garrison Juan Fernandez meant that they intended to try to keep the Pacific closed. The British Admiralty was resolved to break down the Spanish claim.

We are now in a position to understand the Secret Instructions of the Admiralty dated 30 July 1768, to Lieutenant James Cook (he had just received his commission as Lieutenant in the Royal Navy). These have recently been published by the Navy Records Society (*Naval Miscellanies*, vol. 3, 1928, pp. 343–50), and are reprinted by permission.

"SECRET ORDERS." P.R.O. ADMIRALTY 2/1332
Additional Secret Instructions To Lieut. James Cook,
Commander Of His Majesty's Bark *The Endeavour*

Whereas the making discoveries of countries hitherto unknown, and the attaining a knowledge of distant parts which though formerly discovered have yet been but imperfectly explored, will redound greatly to the honour of this nation as a Maritime Power, as well as to the dignity of the Crown of Great Britain, and may tend greatly to the advancement of the trade and navigation thereof; and whereas there is reason to imagine that a continent, or land of great extent, may be found to the southward of the tract lately made by Captain Wallis in His Majesty's ship the *Dolphin* (of which you will herewith receive a copy) or of the tract of any former navigators in pursuits of the like kind; you are therefore in pursuance of His Majesty's pleasure hereby required and directed to put to sea with the bark you command, so soon as the observation of the transit of the planet Venus shall be finished, and observe the following instructions.

You are to proceed to the southward in order to make discovery of the continent above mentioned until you arrive in the latitude of 40°, unless you sooner fall in with it: but not having discovered it, or any evident signs of it, in that run, you are to proceed in search of it to the westward, between the latitude before mentioned and the latitude of 35° until you discover it or fall in with the Eastern side of the land discovered by Tasman and now called New Zealand.

If you discover the continent above mentioned, either in your run to the southward, or to the westward, as above directed, you are to employ yourself diligently in exploring as great an extent of the coast as you can; carefully observing the true situation thereof both in latitude and longitude, the variation of the needle, bearings of headlands, height, direction, and course of the tides and currents, depths and soundings of the sea, shoals, rocks, etc. . . .

You are also carefully to observe the nature of the soil and the products thereof, the beasts and fowls that inhabit or frequent it, the fishes that are to be found in the rivers or upon the coast and in what plenty; and in case you find any mines, minerals or valuable stones, you are to bring home specimens of each, as also such specimens of the seeds of the trees, fruits and grains as you may be able to collect, and transmit them to our Secretary, that we may cause proper examination and experiments to be made of them.

You are likewise to observe the genius, temper, disposition and number of the natives, if there be any, and endeavour by all proper means to cultivate a friendship and alliance with them, making them presents of such trifles as they may value, inviting them to traffic. . . .

You are also with the consent of the natives to take possession of convenient situations in the country, in the name of the King of Great Britain;

or, if you find the country uninhabited, take possession for His Majesty by setting up proper marks and inscriptions, as first discoverers and possessors.

But if you should fail of discovering the continent before mentioned, you will, upon falling in with New Zealand, carefully observe the latitude and longitude in which that land is situated, and explore as much of the coast as the condition of the Bark, the health of her crew, and the state of your provisions will admit of, having always great attention to reserve as much of the latter as will enable you to reach some known Port where you may procure a sufficiency to carry you to England, either round the Cape of Good Hope, or Cape Horn, as from circumstances you may judge the most eligible way of returning home.

You will also observe with accuracy the situation of such islands as you may discover in the course of your voyage that have not hitherto been discovered by any Europeans, and take possession for His Majesty and make surveys and draughts of such of them as may appear to be of consequence, without suffering yourself however to be thereby diverted from the object which you are always to have in view, the discovery of the Southern Continent so often mentioned.

But for as much as in an undertaking of this nature, several emergencies may arise not to be foreseen, and therefore not particularly to be provided for by instructions beforehand, you are, in all such cases, to proceed, as upon advice with your officers, you shall judge most advantageous to the service on which you are employed.

You are to send by all proper conveyances to the Secretary of the Royal Society, copies of the observations you shall have made of the transit of Venus, and you are at the same time to send to our Secretary, for our information, accounts of your proceedings, and copies of the surveys and drawings you shall have made. And upon your arrival in England you are immediately to repair to this office in order to lay before us a full account of your proceedings in the whole course of your voyage, taking care before you leave the vessel to demand from the officers and Petty Officers the log books and journals they may have kept, and to seal them up for our inspection, and enjoining them, and the whole crew not to divulge where they have been until they shall have permission so to do.

Given &c. the 30th of July 1768.

ED. HAWKE.
PY. BRETT.
C. SPENCER.

To Lieut. James Cook,
Comr of His Majesty's Bark
the Endeavour.

These Secret Instructions show that the observation of the transit of Venus at Tahiti was merely a preliminary incident in the voyage, the real importance of which lay in the discovery and annexation of valuable posts in the Southern Continent. Here is the clue to all Cook's proceedings. He did not annex Tahiti because Captain Wallis may have previously annexed it (1767); but after surveying the coasts of New Zealand with a care which still makes his charts valuable, he annexed those islands, though he had himself proved that they were separated from the great Southern Continent. Very similar were his proceedings on the east coast of New Holland, re-named by him New South Wales. After surveying it carefully from Cape Howe to Cape York he annexed the whole of this immense and valuable coast-line. He was careful to explain

that this coast had not been discovered by Europeans—a statement which was correct; for Tasman in 1642 had touched only at the south part of the land, which he called Van Diemen's Land, and then stood away east towards New Zealand. Cook therefore was within his instructions when he annexed the whole of the east of New Holland.

Brilliant and important though these discoveries were, he had not really fulfilled the purpose of his expedition, which was the discovery of the great Southern Continent. Indeed, Tasman and he had proved that New Zealand and New Holland were great islands removed from that Continent. Therefore in 1772 the Admiralty, now under Lord Sandwich as First Lord, resolved to despatch again their splendid executant, now Commander Cook, to set at rest this vexed question. A Frenchman, Kerguelen, had been searching for that elusive continent; and Dalrymple, Cook's bitter enemy, now gave out that it contained over 50,000,000 of people, and must be far wealthier than our American colonies.*

A further sign of the eagerness of European peoples about Antarctica had appeared in 1770, when Spain sharply questioned our right to the Falkland Islands, annexed by Captain Byron in 1765.† So determined was Charles III of Spain to have those islands for Spain that war seemed imminent on that question. Indeed, it would have broken out if Louis XV had supported Charles III; but Louis was indolent and would not give effect to the Family Compact. Therefore Spain gave way before our threatening naval preparations; and the Falklands remained to us. Of course their value was solely strategic. They were the outposts to the Pacific, as also to the Southern Continent some scores of leagues to the south of the Falklands. But the Falklands dispute of 1770 illustrates the extreme eagerness of England and Spain to have a good halfway house to the Pacific and to that continent of many hopes.

Cook's Secret Instructions, dated 25 June 1772, are in the main a repetition of those for his first voyage. Again he is to search for the Southern Continent, but this time by way of the Cape of Good Hope, that is, on the track of Bouvet, especially about Cape Circumcision in 54° S. and 11° 20′ E. He is also bidden to annex favourable posts in the continent with consent of the natives.‡ Above all he is to push his discoveries as near as may be to the South Pole and circumnavigate the globe in as high latitudes as possible, coming back northwards only to rest and refresh his crews. Obviously Sandwich and his colleagues were resolved that the Cross of St. George should be the first to wave over the South Pole and its guardian continent.

We all know with what devotion Cook and his patient crew of the *Resolution* hammered away at the Antarctic barrier, but in vain. His iron strength broke down under the prolonged strain of cold and privation, varied only by nauseating meals of highly salted meat and mouldy biscuits. The crew never mutinied—none of Cook's crews ever did; but discontent became rife. So the struggle ended—in failure if you will. But was it failure to dispose of a dangerous illusion which had danced before the eyes of men for thousands

*Mill, H. R., *op. cit.*, p. 63.
†Goebel, J., "The Struggle for the Falklands," pp. 231-240.
‡*Naval Miscellanies* (N.R.S.), III, 353.

of years? The navigator who for many months struggled with ice and hunger in order to discover that the fabled wealth of Antarctica was a mischievous myth deserves the thanks of all friends of peace for brushing aside a potent incentive to war.

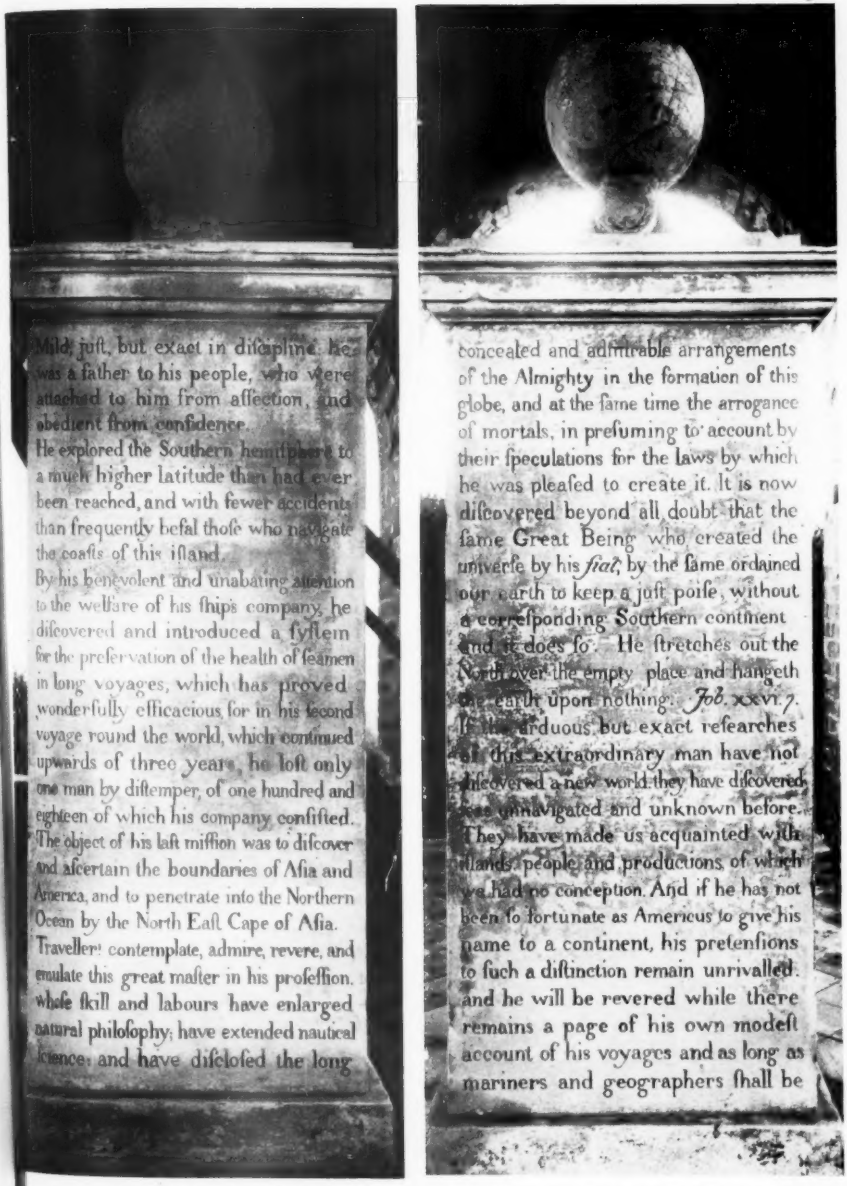
Just as Cook's first voyage reminds us of the discoveries of Drake nearly two centuries earlier, so too his third voyage touches on the fringe of that of the great Elizabethan. The Admiralty now instructed him to discover a passage from the North Pacific to the North Atlantic which Drake and later explorers had failed to find. Again we note in the Instructions (dated 6 July 1776—two days after the American Declaration of Independence) that he was forbidden to touch at any Spanish port or settlement in California; but he is to make for the coast of New Albion and thence proceed north to lat. 65°. Thereabouts he will explore all rivers or inlets which point towards Hudson Bay or Baffin's Bay. Clearly, then, the hostility of Spain was anticipated.

The ever-present might of Nature, not the declining power of Spain, proved to be his arch-enemy. The name Cook Inlet, to the south-east of the Alaska Peninsula, reminds us of the hopes which that deep gulf must have inspired, only to disappoint them. Then, after passing through Bering's Straits and reaching lat. 70° 44′, the southward drift of the ice compelled him to put about (28 August 1778), and he never returned to the north.

During his long stay at Nootka or King George's Sound (in what is now called Vancouver Island) he had noted the extreme eagerness of the Indians to get iron or any metal. On the whole, when they did not steal, they proved fair in their dealings with him. Fish and furs were their chief wealth; and everything promised a good trade with them. Some of his crew also noted the chance of opening a brisk trade in furs, which were plentiful, with China, where furs are scarce and precious.

Accordingly, after his lamentable death at Hawaii, and after their return to England, some of them resolved to trade between Nootka Sound and China in furs, ginseng, and other marketable commodities. Chief among these followers of Cook were Portlock, Dixon, Meares and Colnett. A company was founded, called the King George's Sound Company, and in 1785 it despatched Portlock and Dixon in two ships which were to trade in skins between Nootka Sound and China; and these two captains in 1786 carried valuable cargoes of furs to Canton. Meares and Colnett (also two of Cook's crew) also carried on this trade, and made a settlement at Nootka, hoisted there the British flag, and built there a sloop which they named the *North-West America*. By the year 1789 at least four British ships were engaged in this trade, when the Spanish authorities from Mexico pounced on the little settlement, captured the ships and property and carried Meares, Colnett and all their belongings to the port of San Blas, in Mexico. At once Pitt and the Duke of Leeds protested strongly against this act of violence, and against the Spanish claim to entire sovereignty in that ocean. Pitt and Leeds maintained that we had the right to "a free and undisturbed enjoyment of the benefits of commerce, navigation and fishery . . . in places unoccupied by other European nations." *

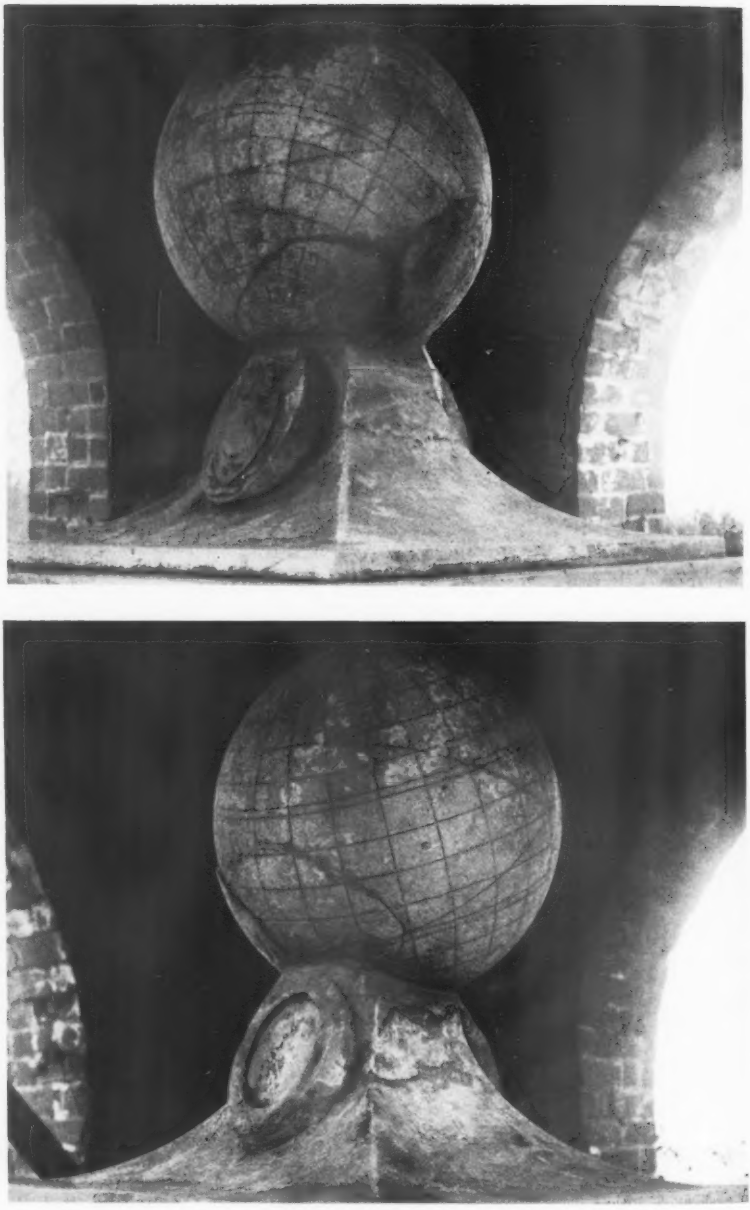
*Rose, J. H., 'Life of Pitt,' I, 569.



Mild, juſt, but exact in diſcipline, he was a father to his people, who were attached to him from affection, and obedient from confidence.
He explored the Southern hemiſphere to a much higher latitude than had ever been reached, and with fewer accidents than frequently befal thoſe who navigate the coaſts of this iſland.
By his benevolent and unabating attention to the welfare of his ſhips company, he diſcovered and introduced a ſyſtem for the preſervation of the health of ſeamen in long voyages, which has proved wonderfully efficacious, for in his ſecond voyage round the world, which continued upwards of three years, he loſt only one man by diſtemper, of one hundred and eighteen of which his company conſiſted.
The object of his laſt miſſion was to diſcover and aſcertain the boundaries of Aſia and America, and to penetrate into the Northern Ocean by the North Eaſt Cape of Aſia.
Traveller! contemplate, admire, revere, and emulate this great maſter in his profeſſion, whoſe ſkill and labours have enlarged natural philoſophy, have extended nautical ſcience, and have diſcloſed the long

concealed and admirable arrangements of the Almighty in the formation of this globe, and at the ſame time the arrogance of mortals, in preſuming to account by their ſpeculations for the laws by which he was pleaſed to create it. It is now diſcovered beyond all doubt that the ſame Great Being who created the univerſe by his *fiat*, by the ſame ordained our earth to keep a juſt poiſe, without a correſponding Southern continent and it does ſo. He ſtretches out the North over the empty place and hangeth the earth upon nothing. *Job.* xxvi. 7.
If his arduous but exact reſearches of this extraordinary man have not diſcovered a new world, they have diſcovered seas unnavigated and unknown before. They have made us acquainted with iſlands, people and productions of which we had no conception. And if he has not been ſo fortunate as Americus to give his name to a continent, his pretenſions to ſuch a diſtinction remain unrivalled, and he will be revered while there remains a page of his own modeſt account of his voyages and as long as mariners and geographers ſhall be

The continuation of the inscription: the concluding lines, on the fourth side, are printed on p. 122



The Globe surmounting the monument

It has been described as showing Cook's tracks on his three voyages: but neither outlines nor tracks can now be seen. The circle inclined 40° to the equator is a curious feature

To give effect to these words, Ministers armed a fleet of thirty-four sail-of-the-line, which put to sea. Spain, meeting with no support from France, gave way, and on 28 October 1790 agreed to make reparation for her acts at Nootka Sound and to concede to British subjects liberty to trade on the coasts north of the Spanish territory, as also almost entire freedom of navigation and fishery in the Pacific Ocean.* Thus a singular chain of events led, in the year 1790, to the opening up of free navigation in the Pacific which Spain had so long sought to keep closed; and these later events were set in motion by Captain James Cook.

Or rather, they were all due in the first instance to the British Admiralty; for it is only fair to remember that all three of Cook's voyages were planned by that body in order to make discoveries and annexations in a great ocean which Spain still sought to keep closed. Probably it was Anson's influence and that of his gallant young officer, Peircy Brett (now Admiral), which in 1768 designed that far-seeing Pacific policy for securing posts of vantage in the Southern Continent. Cook was merely the executant of the Admiralty; and it is obvious that a man just appointed lieutenant, would not, without full authorization, annex groups of islands and the whole of the east coast of Australia. This last event soon bore fruit; for, as is well known, the settlement on the Australian coast in 1788 was due to the descriptions of the great botanist, Sir Joseph Banks, and still more to the suggestions of James Matra, both of whom had been in Cook's first voyage. Other annexations and settlements might have resulted from these voyages but for the disastrous War of American Independence, which was proceeding during his third great effort along the coast of Drake's discovery, "New Albion." If the times had been more propitious, perhaps Great Britain would have re-annexed "New Albion" and the coast to the north of it. But even in those disastrous years 1780–83, when our old Empire was rent asunder, Cook's last voyage led on to trading enterprises based on Nootka Sound; and these in their turn gave us a prior claim to that coast and were the means of vindicating the British contention that the Pacific was not under Spanish control. The Nootka Sound episode probably had even wider results; for from Captain Portlock's narrative it would seem that an enterprising Canadian explorer (either Pont or Mackenzie) was induced thereby to make his way across the Rocky Mountains towards the Pacific Ocean.

Therefore it is on no vague claim that Cook may be hailed, not only as the discoverer of several groups of islands in the Pacific, as the intrepid voyager who explored the coasts of New Zealand and Eastern Australia, but also as the chief explorer of the coast of what is now British Columbia, as the man who started the impulse which led to the North American–China trade, and thus laid the foundations of British power both in the south-western and the north-eastern parts of the Pacific Ocean.

*Goebel, *op. cit.*, pp. 425–429.

COOK AS AN HYDROGRAPHICAL SURVEYOR: *A paper read at the Evening Meeting of the Society on 17 December 1928 by*

REAR-ADMIRAL H. P. DOUGLAS, C.M.G., HYDROGRAPHER OF THE NAVY

IT was in the year 1759 that Cook, then at the age of thirty, was first heard of as a surveyor in connection with his well-known work of examining the St. Lawrence river and its channel, thereby making possible the attack on Quebec and the passage of the ships of the fleet in waters where the enemy had not dared to risk their vessels. This task brought out his bent for such work, and that he had a natural gift for it there is no doubt at all. Admiral Saunders happily recognized this and saw to it that his talents were not wasted. His appointment to H.M.S. *Northumberland*, flying the flag of the Commander-in-Chief of the North American Station, Admiral Lord Colville, followed in September 1759, and it is recorded that during this winter Cook set himself to study the theoretical side of his work. His application and perseverance must now have stood him in good stead, for at his age and without any extensive education as a boy he was able to attain considerable knowledge of the subject. That he succeeded is beyond question, as his charts testify, in the manner that they compare with present-day editions.

He worked for the next two years with the fleet in the River St. Lawrence, and Captain Graves on his appointment as Governor of Newfoundland in 1763 took Cook with him as his surveyor. During this year the latter completed a survey of the islands of Miquelon and St. Pierre (a plan on a scale M=1·2 inch).

In 1764 Captain Palliser took over the Governorship. Cook had already served under him and was high in his esteem, and now surveyed the coasts of Newfoundland under his direction. Palliser arranged that Cook should have the schooner *Grenville*, the Governor's despatch vessel, and it was in this ship that Cook spent the next four years, and the area that he covered is shown in the reproduction—from the Straits of Belle Isle down the West Coast and then as far east along the South Coast as Cape Chapeau Rouge and the St. Lawrence harbours. Cook's surveying here was of a thorough and detailed nature and his charts he drew himself. That there was a basis of triangulation is indicated by the title to the chart of the coast from Point Ferolle to Cape Auguille, which commences with "An exact trigonometrical survey" and it is known that he had a theodolite amongst his instruments. It is unfortunate that there should be no traces of his plan of triangulation and the positions of his main stations on the original documents.

During this period Cook also observed an eclipse of the sun at Eclipse Island in the Burgeo Group, and the Cairn now standing there was erected by him. It occurred in August 1766 and was observed with a brass telescopic quadrant made by Mr. John Bird, and Cook wrote a paper on the subject which was read before the Royal Society in April 1767. This, together with his charts and sailing directions for the St. Lawrence and Newfoundland coasts, established for him a well-deserved reputation with the higher authorities. Consequently, when the Royal Society presented a memorial to the King setting forth the advantages to be gained from the observation of the transit of Venus in the South Seas in 1769, it is not surprising to find Cook's

name considered for the position of leader of the expedition. True, Dalrymple was first choice—he was the East Indian Hydrographer and afterwards was appointed as the first Hydrographer to the Admiralty—but Cook's naval rank turned the scale in his favour, as making him a more fitting commander for such an expedition.

A man more suitable can hardly be imagined; exploration and discovery were to be the further objects, and with Cook, discovery meant surveying and charting. With unlimited energy, methodical, attentive to details and of tremendous perseverance, it is typical of the man that he remarks unhappily on leaving the shores of New Caledonia during his second voyage that he had "for the first time to leave a coast I had discovered before it was fully explored," and this for the very good reason that with summer approaching he was due to continue his search for the Southern Continent.

From August 1768, when this expedition set out, until his premature and untimely death in 1779, Cook was busily employed on his three voyages of circumnavigation—a period of nearly eleven years with only two spells of a year each at home during it. A large proportion of the time was spent in the South Seas, but his surveying work ranged from a sketch-plan of the anchorage in Rio de Janeiro to a chart of the Bering Straits.

Cook's methods of surveying are unfortunately not mentioned in his journals, nor is it possible to find traces of the plotting and drawing in of the coast-line on the originals. His work during these voyages had necessarily to be of a different kind from his regular surveys of Newfoundland and consisted to a great extent of "running surveys" in which he kept his ship in close proximity to the coast, sailing often for hundreds of miles without landing. This type had nothing for its basis but the astronomically observed positions of the ship with the dead reckoning by compass and log adjusted in between. No chronometer was carried on the first voyage, and on the other two those carried could so rarely be rated that the method of fixing was the comparatively laborious and unreliable observations of lunar distances.

Mr. Green was sent from the Greenwich Observatory on the first voyage, and on the second Messrs. Wales and Bailey were appointed by the Board of Longitude; but on the third and last Cook undertook to carry out the necessary observations with the assistance of his second lieutenant, Mr. King. Numerous sets of these lunars were always observed, and it is recorded that 137 of them were meaned to obtain the longitude of Nootka Sound. The accuracy of the results varied, however, and though generally speaking Cook's positions were near the truth, Cape Finisterre was charted 29′ of longitude in error on the first voyage and the Torres Straits over a degree wrong. The latter, however, was partially owing to few opportunities, bad conditions for observing, and the illness of Mr. Green.

Quadrants and sextants were in common use by all the officers, and it is interesting to note Cook's remarks in the early part of his second voyage on the introduction of telescopes into the sextants for observing lunars and the increase of accuracy after practice in their use. From a contemporary treatise on surveying by Dalrymple we know that horizontal sextant angles and the station-pointer fix were in use and even an early form of the station-pointer for plotting. Bases were measured by sound with the time interval measured

by the beats of an accurately constructed pendulum and distances by masthead heights made use of.

The compass was, however, Cook's most useful instrument on his coastal surveys, and he was most assiduous in observing the variation wherever he went. For example, on his first voyage he made a table giving over 250 positions and the amount of variation there ascertained. He suspected some particular attraction in the ship to account for certain differences, but in common with other navigators of the day had no knowledge of deviation. Its amount, however, would not be very large in a ship of the *Endeavour* or *Resolution* class.

In harbour Cook and his assistants studied the rise and fall of the tides with reference to the moon, and he noticed the diurnal inequality on the coast of Australia when lying in Endeavour River. He remarks on the direction of the flood stream and usually with great intelligence as later theories prove. Currents, too, were observed as opportunity arose when on passage, and found either by the difference between dead reckoning and observed positions or alternatively, on a calm day, hoisting out a small boat, anchoring it by a weight 80 to 100 fathoms below the surface and measuring the ship's drift.

The First Voyage

Leaving England in August 1768 Cook's first surveying work, apart from assiduously observing positions of Cape Finisterre, the Salvages, Cape Verde islands and other places en route, consisted of a sketch-plan of Rio de Janeiro anchorage. Arriving here on November 14 the Portuguese authorities, not believing the *Endeavour* to be a man-of-war and having their suspicions aroused, delayed Cook in his provisioning and watering, but he seized the opportunity to do some surveying. All the observations had to be taken from the ship, and he says of it, "This plan had no pretensions to accuracy yet it will give a very good idea of the place, differing not much from the truth in what is essential." The directions he wrote for entering harbour were however very thorough.

Next, falling in with the coast 60 miles north-west of the Straits de la Maire, he charted the coast from thence to Cape Horn and drew a plan of Success Bay, in which he anchored. He also wrote sailing directions with excellent advice for the passage of the Straits. In touch with the land for only a fortnight he covered a lot of ground, but though he remarks on leaving that "few parts of the world are better ascertained being determined by several observations of the sun and moon both by himself and Mr. Green," their longitude of Cape Horn was nearly a degree in error.

A passage of two months and Cook sighted the Low Archipelago and, fixing the position of a number of the islands in the group, anchored in Matavai Bay, Tahiti, on 13 April 1769. Here the transit of Venus was successfully observed on a day that "proved as favourable to our purpose as we could wish," and during his stay of three months he surveyed Tahiti and the neighbouring island of Murea in detail, obtaining the position of Point Venus within 2 or 3 miles. As usual he wrote complete sailing directions, and observed the variation and the tides.

Hearing from the native Tupia of islands one or two days' sail to the westward, he made for and discovered the remainder of the Society Islands, and,

remaining three weeks, examined the group and drew a chart on a scale of M=0·3 inch, commenting on the various anchorages and their entrances. Sailing southward he next discovered Rurutu in the Austral group, but did no more than fix the position and make the circuit of the island, as he found no safe harbour or anchorage to make a closer study worth his while.

Continuing southward in accordance with his orders, which were to reach 40° S. and then proceed westward between 40° and 35° S. until he fell in with New Zealand, Cook sighted nothing until 7 October 1769, when he made the North Island and anchored in Poverty Bay, which, as its name implies, afforded them "no one thing they wanted." Four days later Cook commenced what he must have afterwards considered to be one of his most complete achievements. Starting firstly to the southward he turned back before reaching Cook Straits and circumnavigated the North Island, coasting and making a running survey as he went. Continuous gales delayed him as he rounded the northern end of the island, but he refused to go on without fixing Cape Maria Van Diemen, and he charted it only 3 miles in error. Reaching Queen Charlotte Sound in the middle of January 1770, Cook climbed a neighbouring hill and saw before him the strait now named after him, and sailing through at the beginning of February he completed the circuit of the North Island in four months. Turning southward Cook started work on the South Island and six weeks later, despite as bad weather off the southern extreme as he met at the northern, he was back in Queen Charlotte Sound.

His charts of the islands consist firstly of one large and one small-scale sheet of the two islands (he did not realize there were three) both on Mercator's projection, a degree of longitude being equal to 4 inches and 1 inch respectively, three sheets of the coasts between Cape Kidnappers and Cape Brett on a scale of M=0·5 as also Cook's Straits and plans of Tolaga Bay, Mercury Bay and Queen Charlotte Sound, which latter he completed in his later visits. These charts are naturally in no great detail, and Cook is the first to admit that in some places they are "very erroneous," but it remains that the general trend of his coast-line is surprisingly accurate when it is realized that in six months he charted some 2400 miles of coast.

Eighteen days at sea and the *Endeavour* made the east coast of Australia near Cape Howe. Turning northward he followed and charted the coast, entering Botany Bay, where he first set foot in Australia on 28 April 1770, the site of his landing being now marked by a monument. Port Jackson, just northward, he could not spare the time to examine, having so recently completed with water, but he charted its entrance and, continuing up the coast, all went well till he grounded off Cape Tribulation and had to put into Endeavour River for repairs. Here he remained from June 17 to August 6, when he proceeded, and getting into difficulties, had to navigate outside the Barrier Reef from Lizard Island to Providential Channel, off Cape Weymouth, finally reaching the Torres Strait on August 22.

His charts are very similar to those of New Zealand in style and scale, there being one of the entire coast, then four separate sheets on Mercator's projection covering the whole coast, and two plans, one of Botany Bay and the other Endeavour River: in all 2000 miles of coast-line surveyed in four months.

Homeward bound Cape Walsche was fixed, and Cook landed in unexplored New Guinea 200 miles to the northward, but did not stay, arriving at Batavia on October 11 and in the Downs, via the Cape, etc., on 13 July 1771. Cook's original charts of this voyage have been bound into one volume and are in the British Museum. Duplicates drawn by his Masters Molyneux and Pickersgill are in the Admiralty.

The Second Voyage

A year later Cook sailed in the *Resolution*, with Furneaux in the *Adventure*, the second ship deemed advisable by Cook after his perilous experience in the Barrier Reef. This time the search for the Southern Continent was the main objective, with retirements northward during the winter months to refit, replenish *and* explore. Finding it necessary to call at the Island of St. Jago for water, a small plan of Port Praya resulted and the Cape was reached at the end of October 1772.

Sailing a month later Cook searched in vain for Bouvet's Cape Circumcision, and his farthest south having been 67° 15′, he retired north to New Zealand and anchored in Dusky Bay. During the six weeks here he made a sketch survey with Pickersgill Harbour as an inset, and despite the complicated maze of islands and inlets the agreement with the present-day chart is surprising.

Coasting along to Queen Charlotte Sound, Cook made observations correcting his former chart and finding Furneaux in the *Adventure* had made a survey of part of Tasmania, Cook decided to sail eastward, keeping in 45° S. Sighting no land he turned north in 135° West and, making the islands of the Low Archipelago, he continued to Tahiti, arriving on 17 August 1773. Sailing westward in September he discovered and fixed Hervey Island and made the Friendly Islands on October 1. Here he surveyed the Tongatabu group, but, staying only a week, went on to Queen Charlotte Sound, New Zealand, to replenish before continuing to the south-east in his search towards the Pole. This time his farthest south was 71° 10′ on January 30, when he altered course to the northward for further exploration in the Pacific, and with the intention to be at Cape Horn in November to carry on the southern search in the Atlantic.

In March 1774 Cook sighted and surveyed the interesting Easter Island, and in April was at the Marquesas. These he charted and drew a plan of Resolution Bay in Sta. Christina, proceeding ten days later past the Low Archipelago to Tahiti. After a short stay in the Society Islands Cook proceeded and discovered Palmerston Island and Niue or Savage Island on his way to the Friendly Islands, where he made a survey of the Nomuka group. Continuing westerly on July 1 he sighted Turtle Island or Vatoa, the only islands of the Fiji Group that he visited, and then made the New Hebrides. Here he remained six weeks, during which he circumnavigated and surveyed the group with plans of two harbours—Port Sandwich in Mallicolo Island, and Port Resolution in Tanna Island. Four days after leaving he discovered New Caledonia and ranged the north-east coast, drawing a chart of it together with a plan of Balade Anchorage, but time getting short, he had to leave the island half explored.

Still, even Cook must have been satisfied with the work accomplished from

July 17, when he sighted the New Hebrides, to October 3, when he set a course for New Zealand. A chart was published soon after his return home of New Hebrides and New Caledonia, showing the ship's track.

Another great discovery followed, and Norfolk Island was charted on the way to New Zealand, where Cook arrived on 17 October 1774. Three weeks later he sailed, and keeping between 50° and 55° S., made Tierra del Fuego and anchored in Christmas Sound on December 21. Of this he drew a plan, and sailing round Cape Horn explored Statenland, collecting his observations of this and the former voyage on to one chart. Next he sighted South Georgia on 16 January 1775, which he circled and surveyed sketchily, and went on to make the discovery of the South Sandwich Group. He laid down part of their eastern coasts on the same chart as his survey of South Georgia, but conditions being bad he sailed after three days, and completing his circuit of the globe in high latitudes, arrived at the Cape of Good Hope in March. Homeward bound in April he was still on the look-out for useful work, so sailed across to ascertain the longitude of Fernando de Noronha, arriving at Spithead in July 1775, 3 years and 18 days from home.

The fairly complete collection of the charts of this voyage is also in the British Museum; several of Cook's officers contributed. Again there are duplicates by Pickersgill in the Admiralty. However, with this as in the third voyage, the charts he made himself are ascertained by reference to his Journals, in which there are reproductions and on the title page of the Third Voyage it is stated that these copies are from originals drawn by a Lieutenant Henry Roberts under Captain Cook's direction.

The Third Voyage

This third voyage commenced in July 1776, and even before the ships left England surveying work was begun by observations for the longitude of Sheerness and Drake's Island, Plymouth, chronometers being used. Similarly with Ushant, Cape Finisterre, and the Peak at Teneriffe on the passage to the Cape of Good Hope, Table Bay being reached in October.

Cook's orders this time were first to search for islands lately seen by the French in 48° 05′ S. and about the meridian of Mauritius, and then replenishing at New Zealand and the Societies to continue in the northern hemisphere. There he was to endeavour to fall in with the coast of New Albion about 45° N. and working northwards search for a north-east or north-west passage, retiring southwards during the winter seasons.

In accordance with these he left the Cape in December 1776, and passing between and observing the position of the Prince Edward Islands, sighted the Kerguelen Islands on Christmas Eve. Anchoring in Christmas Sound he drew a plan of it and also of Port Palliser and sketch surveyed the eastern coast of the island during his stay of six days in the vicinity. Twenty-four days later Van Diemen Land or Tasmania was reached, and here Cook made a plan of Adventure Bay, and also made one or two adjustments to Furneaux's chart of the previous voyage. Next he reached New Zealand, where he stayed a fortnight, and sailing east and north discovered Mangaia Island on 30 March 1777. Fixing this, his next discovery was Atiu, also in the Cook Islands, after which he proceeded via the Hervey Islands, Palmerston and Savage Island to

the Friendlies. Making a prolonged stay mostly at Tongatabu, he charted the islands in more detail than previously, and drew a plan of Tongatabu Harbour.

In July 1777 Cook sailed eastward to the Society Islands, where he remained till December making detailed observations of the tides, the variation and the dip of the compass needle, and observing the rate of the chronometers. Steering northward he discovered and charted Christmas Island between 24 December and 1 January 1778, and observed an eclipse of the sun there. Its longitude is correct within two or three minutes. On January 18 followed the great discovery of the Sandwich Islands, but only staying till February 2 so as to get north on his main object, he carried out no survey but fixed the position of the islands he saw. He realized their important position and of course intended to return to complete their exploration.

Five weeks later the coast of New Albion, in latitude 44° 33′ N. was sighted, and here Cook commenced a coastal survey and first found anchorage in King George's or Nootka Sound. Of this he drew a plan during the month that he lay there. On sailing thence a severe storm kept him away from the coast, which he did not regain till in the vicinity of Mount Edgcumbe, in latitude 57° N. From May 12 to June 7 he was employed in exploring King William Sound and Cook inlet, thinking he might have found a passage to the north. He surveyed and drew a chart of them in considerable detail.

Arriving at Unalaska at the end of June he drew a plan of Samganuda Bay, and after a stay of four days commenced his exploration to the northward. Through the Bering Strait he reached Icy Cape on the American side, and in August crossed over to Cape North on the Asiatic side. Returning through the Strait in September Cook explored Norton Sound, and this is shown on the chart he drew of the Bering Strait. An extract from his Journal reads, "In justice to the memory of Bering, I must say, that he delineated the coast very well and fixed the latitude and longitude of the points better than could be expected from the methods he had to go by." Bering was here fifty years before Cook.

In Norton Sound till the middle of September, Cook realized it was time to leave the high northern latitudes, but did not relish the idea of going to Petropavlovsk in Kamchatka as his orders suggested. This would have meant lying inactive for six or seven months, so he decided to return to the Sandwich Islands. Calling at Unalaska on the way for water fine weather gave him the opportunity to observe the longitude of Samganuda Harbour and obtain an error for the chronometer.

Sailing at the end of October, Cook sighted the Sandwich Islands again on November 26 and discovered the islands of Maui and then Hawaii. Sailing round the coast of the latter it was, however, not till the middle of January that he found a harbour and anchored in Kealakekua Bay. Less than a month later, on 14 February 1779, Cook's career was brought to an untimely end by his death at the hands of the natives.

I am indebted to Commander J. A. Rupert-Jones, R.D., R.N.R., for some of the information regarding Cook's work in Newfoundland, and also to Lieut.-Commander A. Day, R.N., for his help and co-operation, and take this opportunity of thanking them.

CAPTAIN COOK AS AN ASTRONOMER: *A paper read at the Evening Meeting of the Society on 17 December 1928 by the Astronomer Royal*

SIR FRANK DYSON, K.B.E., F.R.S.

ONE of the great problems of Astronomy has been the determination of the distance of the Sun from the Earth. In 1639 Horrocks, who was only twenty-five years old, calculated the time of a transit of Venus, observed the transit, and concluded that the Sun was at least 60 million miles distant. Flamsteed, about 1700 gave the distance as at least 75 million miles. In 1671, by actual triangulation of the planet Mars from Paris and Cayenne in South America, the distance was measured as 87 million miles. Halley pointed out that the transits of Venus across the Sun might be used for this determination. As seen from two different stations of the Earth, Venus crosses the Sun in slightly different chords. If the times she takes are carefully observed, Halley thought that an accuracy of 1 per cent. might be obtained. So expeditions were sent out in 1761 to all over the world, from Tobolsk to Kerguelen, and observations made, but the results obtained for the distance varied from 75 millions to 97 million miles. Another transit of Venus was due to occur in June 1769, and there would be no other for over a hundred years; so still more extensive preparations were made. "It is to be hoped," says a writer in the *Philosophical Transactions* of the Royal Society, "that every civilized nation of the universe will give due attention to that interesting phenomenon, which we, the present possessors of these sublunary regions, shall behold no more; and that proper persons will be sent in due time, and duly equipped, to the advantageous stations." Besides the European observatories, stations were selected in Siberia, California, Hudson Bay, Madras, and the Island of Otaheite, and Captain Cook was put in charge of the expedition to this last. To show there can be no doubt that he was a proper person, I cannot do better than give the introductory paragraph of a paper he read at the Royal Society on 21 November 1771, after his return :

> *Observations made, by appointment of the Royal Society, at King George's Island in the South Sea; by Mr. Charles Green, formerly Assistant at the Royal Observatory at Greenwich, and Lieut. James Cook, of his Majesty's ship the* Endeavour.
>
> *Read November 21, 1771.*
>
> 1769, April 13. We came to an anchor in Royal Bay in King George's island.
> 15. Affixed upon the North point of the Bay, which is the most Northern point of the island, for the place of observations; here we built a small fort, to secure us against the native, which we called fort Venus; it was not finished and the instruments set up in proper order until the 10th May, therefore the time for all observations made before this day, was taken by a watch with a second hand, the going of which was ascertained by altitudes of the sun as often as were necessary.
>
> The Astronomical clock, made by Shelton and furnished with a gridiron pendulum, was set up in the middle of one end of a large tent, in a frame of wood made for the purpose at Greenwich, fixed firm and as low in the ground as the door clock-case would admit, and to prevent its being disturbed by any accident, another frame of wood was made round this, at a distance of one foot from it. The pendulum was adjusted exactly to the same length as it had

been at Greenwich. Without the end of the tent facing the clock, and 12 feet from it, stood the Observatory, in which were set up the journeyman clock and astronomical quadrant: this last, made by Mr. Bird, of one foot radius, stood upon the head of a large cask fixed firm in the ground, and well filled with wet heavy sand. A sentinel was placed continually over the tent and Observatory, with orders to suffer no one to enter either the one or the other, but those whose business it was. The telescopes made use of in the observations were—Two reflecting ones of 2 feet focus each, made by the late Mr. Short, one of which was furnished with an object glass micrometer. Thus furnished, the following observations were made :

[Then followed the details of observations of equal altitude made for time—the observations of Sun and stars for altitude—observations of Moon and Jupiter's satellites for longitude.]

On the day of the transit "every wished-for favourable circumstance attended the whole of that day, without one single impediment, excepting the heat, which was intolerable ";

Transit of Venus by Capt. Cook, with a reflecting telescope focus of 2 feet focus and the magnifying power 140.

	App. time June 2.	
The first visible appearance of Venus on the Sun's limb ..	21.25.45	(1)
First internal contact, or the limb of Venus seemed to coincide with the sun's	21.43.15	(2)
A small thread of light seen below the penumbra	21.44.15	(3)
	June 3.	
Second internal contact of the penumbra, or the thread of light wholly broke	3.14.13	(4)
Second internal contact of the bodies, and appeared as in the first	3.14.45	(5)
Second external contact of the bodies	3.21.32	(6)
Total egress of penumbra, Dubious	3.32. 2	(7)

Captain Cook put down exactly what he observed. He noticed the penumbra when Venus was as far on the limb as in (4). It appeared to be very difficult to judge precisely the time at which the internal contacts of the body of Venus happened, by reason of the darkness of the penumbra at the Sun's limb, it being nearly if not quite as dark as the planet.

The difficulties arising from the halo round Venus and more still from the black drop which were so carefully noted by Captain Cook made a precise determination of the times of ingress and egress impossible. No one could be sure that the times given by Captain Cook at Otaheite corresponded to the same stage of the phenomenon as the times given by other observers in other places. Consequently the uncertainty in the Sun's distance was only slightly reduced. Encke derived the distance as 97 millions, but other astronomers might have put it at 90 millions from the same observations. A similar oifficulty was found in the transits of 1874 and 1872, and Gill decided that dther methods must be used. Working on other lines he found the Sun's distance to be a little less than 93 million miles. Your Secretary, Mr. Hinks, found a nearly identical result with an accuracy of about 1 part in 2000 from the observations of the Planet Eros made in 1900–1901.

There is one other point which should be mentioned. By his careful

observations for time, Captain Cook found that a pendulum of the same length took rather longer to swing at Otaheite than at Greenwich, and that gravity was consequently 3 parts in 1000 less. He also made observations of the tides and the Dipping Needle, and throughout the whole voyage of the *Endeavour* observed the Variation of the Compass. Astronomers, Geodesists, and Magneticians are proud to join Geographers in their tribute to the great Navigator.

DISCUSSION

Before the papers were read the PRESIDENT (Colonel Sir CHARLES CLOSE) said: On October 27 last some representatives of the Council of your Society attended, in company with representatives of the Dominions and of the British Empire League, to lay wreaths at the foot of the statue of Captain James Cook. October 27 was the birthday of Captain Cook, and we then, in some way, celebrated his bicentenary, but it was felt that, as a Society, we ought to do more, and that we should mark the occasion in some special way; and so it was decided to devote an evening meeting to recounting the merits and achievements of Captain Cook and listening to the circumstances which attended those achievements.

We have been very fortunate in obtaining the collaboration of many high authorities this evening. We shall have, for instance, a paper by Sir Henry Newbolt which was delivered at Honolulu in August last on the occasion of the celebrations there. Sir Henry Newbolt regrets that he is unable to attend to-night, but we have his permission and also the permission of the Foreign Office to read the paper, which is a relatively short one. As Sir Henry is unable to be present Admiral Sir William Goodenough has very kindly consented to read the paper. After this we shall hope to hear from Professor Holland Rose an account of Captain Cook and the founding of the British power in the Pacific. After that we shall hope to hear Admiral Douglas, the Hydrographer of the Navy, discussing Captain Cook from the point of view of his hydrographic surveys; and after that—we have not finished yet!—we shall, I hope, hear the Astronomer Royal discuss Captain Cook's astronomical work; and after that we hope to hear Admiral Sir Mostyn Field discuss, again, Cook's hydrographic work. You see we have a good deal in front of us, and I will ask Admiral Sir William Goodenough to begin.

The papers as printed above were then read, and a discussion followed.

Admiral Sir MOSTYN FIELD: The President having called on me to speak, I should like to say something of the veneration in which Cook's character and achievement are held by Hydrographic Surveyors. His early life afforded him no opportunities of acquiring scientific knowledge. He was entirely self-taught. But in spite of these disabilities it has been well said of him that he is the originator of the art of Modern Marine Surveying. Cook was indeed a born surveyor.

His first voyage was concerned mainly with the exploration and charting of the coasts of New Zealand and east coast of Australia. As an instance of the indomitable resolution and tenacity of purpose in prosecuting such work in the face of great difficulties, it may be recalled how for six weeks he battled against continuous gales off the north-west coast of New Zealand until he could lay down the coast to his satisfaction and fix accurately the north point of the island. The position he assigned to it is practically unaltered to this day. Those who are acquainted with that locality will best appreciate the achievement.

An example of fortitude and seamanlike resourcefulness is to be seen in the way in which he succeeded in rescuing his ship from a perilous position on a

coral reef on the Queensland coast, and so badly damaged as to be in a sinking condition. Finding a suitable spot for beaching the ship, with his own resources he repaired her sufficiently to reach the nearest port, Batavia, 1500 miles away, and meanwhile continued his surveying operations undeterred.

Another incident in that voyage is also deserving of mention. Finding himself with a light wind, embayed on the outer side of the Great Barrier Reef, with the reefs close to him, and the ship drifting slowly but surely on them with the heavy swell of the great ocean breaking mountains high on their outer edges, Cook's calmness and promptitude saved him, and the ship was pushed through a narrow channel in that terrible reef, into the smooth water within. No event in the voyage is more dramatically narrated, though without exaggeration, than this hairbreadth escape.

Cook's second voyage was remarkable for the high latitudes he reached and brought his qualities as a seaman and commander more prominently to view than the former. Instead of mapping coasts and islands, the principal duty was exploration of tempestuous seas in high latitudes, amongst ice. A main factor in Cook's success as an explorer was his ability to keep the sea for long periods. Scurvy had crippled every exploring expedition up to that time, until Cook himself, by unremitting attention to the health of his ship's company, devised a system the result of which was complete immunity from more than the symptoms of scurvy. Thus he was able to say when he returned, that no man had died, not only of the dreaded disease, but of any other due to the exposure of a voyage lasting three years, and during which the exposure to heat, cold, rain, and all the hardships of a sea life was probably never surpassed.

Of Cook's character none could be a better judge than Captain King, his second in command, from whose writings the following extract is taken: "The qualities of his mind were of the same hardy, vigorous kind with those of his body. His understanding was strong and perspicacious. His judgment in whatever related to the services he was engaged in, quick and sure. His designs were bold and manly; and both in the conception and in the mode of execution, bore evident marks of a great original genius. His courage was cool and determined, and accompanied by an admirable presence of mind in the moment of danger. His manners were plain and unaffected."

Well may Englishmen be proud that this greatest of navigators was their countryman.

Admiral Sir WILLIAM GOODENOUGH: There is one other light on Captain Cook's life and character which has not been shown to-night. Those who are neither geographers nor scientists, astronomers or even—much as we may pity their lot—naval officers, may say, "Yes, very interesting; a very marvellous life, but we would like something brought rather nearer home to us." I think, Sir, it may be contained in this: When the statue at Sydney to Captain Cook was unveiled in 1873 the man who unveiled it—he happened to be my father—spoke of the intense pleasure it would have given Captain Cook, a man of great humanity, to see cottages where all those who were industrious could live in comfort as a result of their labour. If that was true fifty-five years ago, how much more true is it now! Great farmsteads in the country; noble buildings in the cities! He might well look with modest pride on what has been made possible by his explorations and surveys. What an inspiration—I was going to say to the youth of this country, but it is not only to them—is Captain Cook's motto, "Nil intentatum reliquit"! We don't know who composed it, for Captain Cook was of those who earn mottos, do not inherit them; but if words can be indicative of a man's life and character, "He left nothing untried" is indicative of the character and life of Captain James Cook.

The PRESIDENT: In closing this discussion I have only one or two remarks to make. I notice in Admiral Wharton's edition of Cook's Journal he says no one suffered from scurvy in his first voyage until they reached Batavia, and I think it is doubtful if any member of the crew suffered from scurvy then. They had been over two years at sea, and at, and after, Batavia thirty-one men of the ship's company died of fever and dysentery, but not of scurvy. In fact, Admiral Wharton states that, on the first voyage, "that dire enemy of seamen, scurvy, had been conquered."

The next point is that Professor Holland Rose mentioned Portlock as one of Cook's companions. Portlock was the father of Colonel Portlock, who was very well known on the Ordnance Survey, and who previously had been fighting in Canada and helped to retain Canada against the attacks of the Americans. In after years the younger Portlock served under Colby, and carried out the principal triangulation of Ireland.

The last remark I should like to make is with regard to the astronomer, Charles Green, who has been mentioned. He accompanied Cook on his first voyage, and I want to read an extract from Cook's *Journal*, as follows: "16 August 1770: It was 6 o'clock [in the morning] and we were not above 80 or 100 yards from the breakers. The same sea that washed the side of the ship rose in a breaker prodigiously high the very next time it did rise, so that between us and destruction was only a dismal Valley, the breadth of one wave." In these circumstances the astronomer went on observing his lunars.

Well, we have to thank all those who have contributed to this evening's discussion; all of them have given us some new light on Cook's character. If we are to single out one particular piece of information which most of us did not know before, I should say it was the information contained in those Secret Instructions for the First Voyage, which Professor Holland Rose has read to us, which certainly I, for one, had never heard of. I think the appearance of them is due to Professor Rose's pertinacity in persuading the Admiralty to hunt for the records.

Admiral Sir HERBERT PUREY-CUST sends the following contribution to the discussion: One aspect of Cook has not been touched upon, and that is the very great appreciation of him and his works that was shown in France at the time from the King downwards. Louis XVI was a keen student of literature, he especially liked books of travel and geography, and one of his favourite works was the 'Voyages of Captain Cook.' The study of Cook made a deep impression on the King's mind. Why, he asked himself, should not France as a maritime nation and a naval Power share in the glory of discovering new lands and penetrating untraversed seas? He sends for the Comte de Fleurieu, the principal geographer in France, whom on account of his knowledge of geography the King had chosen to be tutor to his son the Dauphin, and whom a few years later he makes Minister of Marine. They thoroughly talk the subject over together, and the King decides (1785) that a voyage shall be undertaken, two ships of the Navy, *La Boussole* and *L'Astrolabe*, are selected and, on the recommendation of the Marquis de Castries, the then Minister of Marine, that fine fellow Lapérouse, described as the ablest seaman in the French Navy, is chosen for the command. Born in 1741, he had joined the Marine Service in 1756, and by this time become a very distinguished officer. Ever since his boyhood he had longed to follow in the footsteps of discoverers such as Byron, Carteret, Wallis, Louis de Bougainville, and over and above all Cook. To the end of his life, down to the final days of his very last voyage, Lapérouse revered the name of Cook.

Over and over again in the instructions now prepared for the voyage—several times on a page in some places—appear references to what Cook had done and to what Cook had left to be done, showing that both King Louis and Fleurieu knew his voyages and charts, not merely as casual readers but intimately. The King in a special audience given to Lapérouse, a little vain of his own geographical knowledge, explains to him the instructions verbally before handing them to him in writing. In the picture gallery at the Palace of Versailles is an oil painting by Mansiau called "Louis XVI giving instructions to M. de Lapérouse for his voyage around the world," a copy of which may also be seen in the Mitchell Library, Sydney. In May 1786 Lapérouse arrives at Owhyhee, the island where Cook had been killed a few years before, and writes in his journal, "Full of admiration and respect as I am for the memory of that great man, he will always be in my eyes the first of navigators. . . . Chance might enable the most ignorant man to discover islands but it belongs only to great men like him to leave nothing more to be done regarding the coast they have found. Navigators, philosophers, physicians, all find in his Voyages interesting and useful things which were the object of his concern. All men, especially all navigators, owe a tribute of praise to his memory." Arriving at Botany Bay 25 January 1788, the very day that Governor Phillip left to establish the settlement of Sydney Cove, Port Jackson, Lapérouse establishes friendly relations with Lieut. King, R.N., gratifying the English especially "by the feeling manner in which he always mentioned the name and talents of Captain Cook." King records, "he informed me that at every place where he has touched or been near, he found all the astronomical and nautical works of Captain Cook to be very exact and true, and concluded by saying, 'In short Mr. Cook has done so much that he has left me nothing to do but to admire his works.' "

Lapérouse followed Cook's guidance in the management of his ships, paying particular attention to the diet of his crews. He did not succeed in keeping scurvy at bay altogether, but, when the disease made its appearance, he met it promptly by securing fresh vegetables for the sufferers, and was so far successful that when he arrived at Botany Bay his whole company were in good health.

NOTE ON THE PHOTOGRAPHS OF THE COOK MONUMENT AT THE VACHE, CHALFONT ST. GILES

The monument to the memory of Captain Cook erected by Admiral Sir Hugh Palliser in the park of his house The Vache, at Chalfont Saint Giles, towards the end of the eighteenth century, seems to have escaped the notice of Cook's biographers, until the long inscription was printed in full by Commander J. A. Rupert-Jones in the Hydrographic Annual for 1913. Cook had served under Palliser in the operations before Quebec and in the surveys of Newfoundland; and Sir Hugh as Controller of the Navy was responsible for fitting out the ships of Cook's three expeditions. The striking tribute he paid to the memory of his friend deserved a better fate than to be forgotten for more than a century. The photographs of the monument here reproduced have been taken for the occasion by Mr. Macbeth. The fourth side of the pillar is now obstructed and cannot be photographed. The inscription continues:

> . . . instructed by his new map of the Southern Hemisphere to trace the various courses and discoveries he has made.
>
> If public service merit public acknowledgement, if the man who adorned and raised the fame of his country is deserving of honours, then Captain Cook deserves to have a monument raised to his memory by a generous and grateful nation.
>
> 'Virtutis uberrimum alimentum est honos.'
>
> Val. Maximus, Lib. 2, Cap. 6

AN EXPEDITION TO THE COCKSCOMB MOUNTAINS, BRITISH HONDURAS, IN MARCH 1928

J. N. OLIPHANT, B.A., CONSERVATOR OF FORESTS,
AND DUNCAN STEVENSON, B.SC., DEPUTY CONSERVATOR OF FORESTS

THE tour was undertaken with the primary object of studying the region in which the Cockscombs are situated, and its possibilities for forest development, agricultural settlement, and as a line of approach to the high-level mahogany area of the western territory. An incidental aim was to clear up doubts regarding the physiography of the range, and to collect as much information as might be possible in the course of a short trip on its vegetation, soil, and rock formation. While we were naturally desirous of reaching the highest point, the expedition was not intended as a mountain-climbing "stunt."

1. *Narrative.*—Mr. Stevenson had about a month before made a preliminary reconnaissance to ascertain and map the best route and method of approach to the mountains, and as a result it was possible to employ animal transport to a starting-point well up on the range at its eastern end, and to reach this point on the afternoon of the second day from the coast, thus saving much time in getting the outfit to work. The data collected on this preliminary trip are incorporated in the present report.

On Sunday, March 11, we set out in the *Lolette* for Punta Gorda, touching at All Pines to arrange transport for the start from that point on the 13th. On the morning of the 12th three Indian bearers from San Pedro Columbia, whose services had been arranged for by Mr. Donald, Assistant Conservator of Forests, Toledo, were taken on board at Punta Gorda, and we returned to All Pines, reaching there in the late afternoon. During the trip down and up the coast, every opportunity was taken, in conditions of poor visibility, of obtaining bearings whereby to fix the position of the Cockscombs, and of sketching the outline of the range in profile from different aspects. These observations proved helpful at a later stage of the expedition.

Early on the morning of the 13th a start was made on the first march to Vernon's Camp 19½ miles distant from All Pines, and 220 feet above sea-level. The writers were accompanied by Mr. Charles Westby, kindly lent by the Tidewater Lumber Co. for the period of the tour; the three Qeqchi (Kekchi) Indians Ramon Tesecun, Juan Tul, and José Chuk; and Samuel Alfred and Charles Bevan in charge of the animals, the latter of whom returned from Vernon's Bank with one of the four horses the following day. Two of the horses were fully, and two partly loaded, the latter being used intermittently as riding animals. The Indians carried their own food and belongings. The march across the pine ridge *via* Regalia, through Cabbage Haul Gap into the South Stann Creek Valley and up that valley through Anthony's Camp to Vernon's Camp, near the point at which the river branches to the north and south of the Cockscombs, was uneventful and through known territory: it requires no detailed description here. Towards evening further bearings on the range were obtained from Vernon's Camp.

On the 14th we proceeded for about 3½ miles up the valley of the Cockscomb branch of South Stann Creek, which extends north-westwards and then

westwards along the north side of the range. It is interesting to note that the truck-pass followed for the first 2 miles is apparently the same as described in the narrative of the Goldsworthy expedition,* and has thus been in existence for forty years. Leaving the truck-pass at Anthony's Barquedier, where the stream swings away from it to the north, we followed the river-bank for a further mile or so, passing "Quam Camp" (260 feet), established during the earlier tour, and then turned up a ridge leading up to the range. After a moderate climb of rather over a mile "Pronto Camp" (750 feet) of Mr. Stevenson's former trip was reached; and after a short stop the party proceeded farther along the ridge north-westerly for a little over three-quarters of a mile. The ground was dry and the slopes slippery. It had been hoped to get the horses farther; but repeated *contretemps* with slipping packs and decrepit saddlery forced a halt. We decided to send the horses back and make camp where we were (Roy Camp, 1170 feet). The Indians were sent to look for water, and we went up to the "Wall" (1380 feet, letter A on the map), a precipitous rock face a short distance beyond camp, from which point of outlook, facing the Hill of Pines, a view along the range is obtainable. These rock formations are much disintegrated, and Mr. Stevenson, on his previous tour, had had an unpleasant experience at this point owing to the breaking away of a large mass of rock immediately below that on which he was standing.

The next day, March 15, was spent in moving camp round the northern contour of the range to a site on a stream descending northwards between the "Wall" and what we now know to be the Hill of Pines (1800 feet, B on map). This contour work is extremely difficult and tedious, and while a certain amount of it is unavoidable, we learnt at an early stage how much easier progress can be made by keeping to the ridges, however steep they may be. In returning for the relay load the Indians, at our suggestion, found a short cut, which, while avoiding the contour work, involved scaling the Wall at one of its less difficult points: even this was preferable to scrambling along the sides of precipitous slopes. While the relay work from Roy Camp, our halting-place of the previous day, to the new Westby Camp (1010 feet) was in progress, we proceeded still farther along the contour by a vile trail, subsequently named "Camino del Diablo," for about a quarter of a mile, then up a ridge to a shoulder of the Hill of Pines (1390 feet). From this shoulder we carried on southwards along the contour for some distance, hoping to reach the main ridge, but meeting some ugly rock faces, and hearing running water below, decided to drop down and explore a possible camp site for the following day. This we found, at the point named Lucky Strike (1150 feet). A small flat, and a running stream with a pool deep enough to bathe in, afforded an excellent jumping-off place for our investigations on the main ridge. Its only defect is the absence of Cohune leaf, but as the weather was fine we were not worrying about shelter. There are caves on the opposite slope in which one could at a pinch take refuge. We returned over the shoulder and *via* the Devil's Trail to Westby Camp, where the first two Quam were shot.

*'Report of the Expedition to the Unexplored Coxcomb Mountains in British Honduras,' by H. E. H. Jerningham. Government Press, Belize, 1888. A further account of the expedition is contained in *Proceedings R.G.S.*, 1889, xi, 542–52, entitled "Expedition to the Cockscomb Mountains, British Honduras," by J. Bellamy.

Phot. D. Stevenson

Looking west from A to Hill of Pines and double peaks K and L

P appeared behind this shoulder on negative

Phot. D. Stevenson

Peaks M and P, and valley of Cockscomb branch of S. Stann Creek, from the east on Hill of Pines (B)

Valley of S. Stann Creek, and the Outlier from B *Phot. D. Stevenson*

Peaks K and L from H; Copetilla in the distance *Phot. D. Stevenson*

Peaks H and B, Hill of Pines; (to right) from J *Phot. H. T. Grant*

On the following morning, March 16, camp was moved to Lucky Strike. It was decided to investigate the approach to the main ridge by two routes, and on reaching the shoulder Stevenson, with Ramon Tesecun, instead of dropping down the ravine to Lucky Strike, carried on southwards along the contour route tried on the previous day. He got up on to the main ridge without much difficulty, passing the clump of pines on his left within easy distance, and made westwards along the ridge. The Conservator and Westby descended to Lucky Strike, and thence ascended a ridge running in a south-westerly to westerly direction up to the main ridge. This route proved the more suitable of the two for transport of baggage to the main ridge. The two trails converged near the top of the hog-back which forms the next elevation on the ridge to the west of the Hill of Pines, and has been lettered C on the map. Thence it was easy going westwards along the ridge to the site of Ridge Camp (1740 feet), beyond which a small rocky excrescence (1880 feet, lettered D) gave a fairly comprehensive view over the surrounding country.

The day was hot and visibility poor, and Stevenson, after scrambling along the northern side of another similar excrescence (E) and climbing the "bump" marked F on the map (2150 feet), turned back, meeting the Conservator and Westby, who were following his trail a short distance behind. The party returned to camp down what may be termed the "Lucky Strike Ridge."

It is necessary at this point to explain how completely we were misled during the first three days on the range by the confused descriptions and incorrect mapping of the Report of the Goldsworthy Expedition of April 1888. The amazing error in the profile incorporated in the map accompanying the report, which indicates an important complex of peaks named "Goldsworthy Molar and Bellamy" to the *east* of the distinctly pictured Hill of Pines, suggests that the topography of the range was never mastered. The Hill referred to is actually the easternmost point of the range, leaving out of account the "Outlier," an associated but quite distinct hill mass lying between Sittee River and South Stann Creek, some 4 miles distant from the Hill of Pines. It is with difficulty conceivable that the "Outlier," viewed from the west, should have been confused with the eastern prominences of the main range on which the party had been climbing; yet study of the documentary evidence leads one to think that this may have been the case. The attempt to reconstruct the proceedings of the Goldsworthy party by piecing together scraps of evidence contained in the Report into a circumstantial whole, is deferred to a later section "Identification of Peaks": meanwhile it will suffice to mention that careful and prolonged study of the Report has strengthened our conviction that the peak which was climbed on 16 April 1888 and named "Victoria" was not the highest point of the range, but the pinnacle shown on our map as K.

To return to our immediate perplexities. A clump of pines—the only one on the main range—had been seen and photographed from the Wall below, but from that point it was not evident that these pines capped a peak, nor that this peak was the only striking prominence in that part of the range. We assumed that the "Goldsworthy-Molar-Bellamy" group shown in the map attached to the Goldsworthy Report must be in juxtaposition to the Hill of Pines, and that we had been working round the northern contour of the whole

mass, whereas actually we had been simply circling the Hill of Pines. Consequently when we got on to the main ridge and looked westwards, we concluded that the Goldsworthy group must be behind us and that the rounded peak facing us and the sharp pinnacle behind it must be "Holland" and "Victoria" respectively. It was this rounded hill (lettered H on the map) which Mr. Grant ascended last year, after a sporting climb up the southern face of the range, and similarly concluded to be "Holland Peak." And, as we shall see hereafter, it *may* be the peak named "Holland" by the Goldsworthy Expedition, and the pinnacle behind it may be the one they named Victoria: but the latter is not the highest point of the range, which lies farther to the west.

On the 17th we moved part of the equipment and stores up the Lucky Strike ridge to Ridge Camp, and sent two Indians back to replenish the water-supply from the creek below. Having done this they were to follow the trail of the exploration party with blankets, food, and water-bottles in case it should be necessary to camp out on the mountain-side. They were also to bring a rope in case of need. With Westby and Ramon we proceeded along the ridge by the route followed on the previous day, over the bumps mapped as F and G (2360 feet) respectively to a point of outlook facing what may for the time being be called Presumed Holland (H), with Presumed Victoria (K) behind it to the right. We were still, be it noted, under the impression that the latter peak was the highest point of the range, and remained so until the following day, though not a little puzzled by the aneroid readings which, together with ocular estimates of relative heights, indicated an elevation much lower than one would ascribe to Victoria. We remained for some time at this point taking photographs, bearings, and sketches; after which, descending to a saddle, we found Grant's mark on a tree, and started thence up the precipitous eastern face of Presumed Holland. Covered with a sphagnum-like moss a foot or more in thickness, and with a sprinkling of shrubby growth, this face is not as difficult to climb as it looks. The tree roots provide hand-hold and the moss foot- and knee-hold, and it is possible to lever oneself up without much difficulty. After some use however the moss gets broken away, and on the return journey on the 19th we found it advisable to use a rope for the descent. The top of Presumed Holland (2660 feet, letter H on the map) is covered with a weird thicket of gnarled, stunted, and moss-covered trees, in which a species of Clusia, with dark fleshy leaves, predominates. This ridge vegetation, in its eerie effect reminds one somewhat of an Arthur Rackham illustration to a fairy tale, and makes it easy to understand how the legends which attach particularly to the Cockscombs of Duendes* and Sessimites, elemental spirits attributed with a generally malignant disposition, have originated. Looking westwards from the summit of this peak Presumed Victoria stood up prominently, blocking the view of the range behind it with the exception of Copetilla visible to the left.

Moving westward from the summit of Presumed Holland we dropped about 100 feet to a small saddle, where we saw for the first time a species of palm known to us (possibly incorrectly) as the Mexican Hat Palm. This palm is characteristic of the higher ridges of the Western Territory, where it occurs at

*Local folk-lore on this subject is particularly diverse; one common belief refers to a "Duende" as a straw-hatted dwarf whose chief diet is composed of ashes.

altitudes of 2000 feet and upwards. From this first saddle we climbed over an excrescence (I) to a second, and up a further slope, where we lunched, and over another excrescence (J) to a third. The pinnacle of Presumed Victoria presented, as we approached, a sheer rock face broken only by a steep and rather sparsely vegetated gully on its north-east side. We thought it best to avoid this and work around the northern contour with a view to finding a better means of access to the summit. Accordingly, after surmounting another small rise, we dropped off the ridge down the northern contour, passed along the foot of a descending rock face, and then proceeded up the foot of an ascending one until the bottom of a ravine was reached up which there seemed to be a chance of getting to the top of the peak. We tackled this and got fairly high up it (2810 feet) until stopped by a difficult rock face.

We were still in a state of bewilderment over the low altitude readings: while Victoria was supposed to be 3700 feet, the peak we were climbing, when viewed from Presumed Holland had not appeared more than 200 or 300 feet above us, and here we were, 2810 feet up, and not far from the top. However, there were indications of a change in the weather which might be affecting the aneroids. As we retraced our steps visibility conditions showed a sudden and marked improvement, and the trigonometrical station above Middlesex some 19 miles away stood out clearly discernible by the naked eye. Photographs and bearing were taken, and the descent resumed. As it was getting late it was decided to camp out on a moss-covered ledge at 2440 feet, beneath the first rock-wall encountered after leaving Presumed Holland.

The two Indians had not caught us up, and Ramon, very reluctant to face the mountain alone in the waning light, was sent back to meet them and bring them up if possible that evening: otherwise as early as possible next morning. We established ourselves meanwhile on the ledge; and the Deputy Conservator of Forests and Westby succeeded, by digging in the shallow soil covering the rock at the base of the rock-wall, in collecting a meagre supply of water. The curtain of moss hanging on the rock face was in places so wet that water could be squeezed from it by the cupful as from a sponge, but a rather acrid vegetable taste deterred one from drinking the water so obtained except when extremely thirsty. Meanwhile it was growing dark and a chilly northerly wind impinging on the rock face was reflected from it in constantly varying directions. A fire was got going with some difficulty and we hoped, somewhat against hope, for the arrival of the Indians with blankets and food. We had almost given them up when the welcome light of a lantern was seen at the top of the slope. After a much-needed meal eked out with mountain cabbage, we settled down to a restless night huddled round the fire, which in its early stages proved difficult to keep going. By the morning it had burnt itself through the moss to the solid rock beneath and the dried moss around it was smouldering like peat. The nocturnal wanderings of figures enveloped in grey army blankets suggested Greyfriars as a name for this camp.

After an early breakfast on the morning of the 18th we resumed our way along the rock faces which characterize the northern face of Presumed Victoria. So confident were we of an early finish to the climb that the two Indians were sent back with instructions to move back the whole temporary camp from the saddle to Lucky Strike, whither we expected to return that

evening. They were, however, to return as far as the bottom of the eastern face of Presumed Holland and await us there with water only. Later in the day we had occasion to regret these instructions, though as it eventually turned out they had no material effect on the situation. While the bulk of the equipment was taken down to Lucky Strike, the Indians displayed foresight in keeping some of the food at Ridge Camp, where it was very welcome on the following day.

Following westwards along the rock-walls forming the northern face of Presumed Victoria, we made one more attempt to scale a ravine and were again unsuccessful. It is quite possible that these ascents could be accomplished by a skilled rock climber, but situated as we were it was inadvisable to take any unnecessary risk. After this second failure we decided to leave the ravines or "flues" alone and to work up the peak round its western face. After clambering for some time along the foot of the rock-wall, we observed a hill lying a little north of west, which we thought must be Allan, but which is really a shoulder running north-eastwards from the main ridge, and we cut across a shallow valley on to it. From some way up this shoulder we observed, looking back in a direction slightly south of east, a gash in the ridge apparently isolating a pinnacle lying east of it. The attainment of this pinnacle, which we took to be one of the "prongs" of Victoria referred to in the Goldsworthy Report, looked as if it might involve a rather tricky bit of rock-climbing, though it is quite possible that the ascent would prove easier than it appeared from where we stood.

From our point of observation on the shoulder we crossed over southwards to the main ridge by way of a neck separating the shoulder from the main mass: from this neck small valleys descended to the east and west. Climbing up, we emerged on the main ridge (3060 feet, lettered M on map) expecting to find Victoria to the eastward. All that could be seen in that direction, however, was a continuation of the ridge on which we were standing without any marked rise in its elevation. But turning westwards we were confronted by a bold group of three peaks, separated from us by a long descending saddle, all of which were considerably higher than the point of observation, and the farthest in all reasonable probability the highest point of the range.

This led to an immediate revision of all our preconceived ideas. We assumed the third and highest mountain to be Victoria, and the apparently insignificant conical peak, lying between it and the bulky rounded mass nearest to us to be Holland; the identity of the near hill was a matter of doubt. At all events our objective for the day was far from attainment. However, we decided, although it was rather late to make a start, to have a try for what we now assumed to be the real Victoria. Even though it might mean a chilly night out on the mountain-side and we were badly supplied with food, the chance seemed too good to be missed. The weather was distinctly cooler and more favourable for climbing: a change seemed likely, and the range might be enveloped in cloud if we put off the attempt.

Accordingly we set off at about 10.30 a.m. down the saddle which runs south-westerly, across a narrow neck, and then up north-westwards to the more bulky of the two peaks between us and our objective. This first peak, mapped as N (3320 feet), presented no great difficulty, and surmounting it at

11.35 a.m. we saw the conical peak O beyond. From our earlier view-point this had been condescendingly referred to as a "pimple." At closer quarters it began to look more formidable: actually it is higher (3450 feet) than its predecessor, though it does not appear so either from M or from the highest peak to the west of it, and it proved the most tricky bit of climbing that had been so far encountered. After an attempt to skirt along the foot of rock faces on its northern side, which if persisted in would have involved serious loss of height, a zigzag route was found to the summit (12.50 p.m.) over moss-covered rock surfaces. Without this piece of luck it is doubtful if our objective could have been reached that day.

Following westwards along the summit of O, we arrived at the inevitable wall dropping down to the saddle connecting the peak on which we were with the mountain confronting us, and at first sight were somewhat daunted by the inhospitable appearance of the eastern face of the latter. On further study the ravine or flue on its north-east side—the repetition of these features is noticeable—looked as if it might prove negotiable, always assuming that we could find a way of descending the wall on which we were perched. Consumption of our last scanty provisions cheered us up somewhat, and the descent of the wall was begun at about 1.10 p.m. There were plenty of trees on the face, but a short distance down this became so perpendicular that the Conservator, who attempted a direct descent, soon found the rôle of Tarzan uncongenial and climbed up again. Meanwhile Stevenson had discovered a reasonably good way of descent on the north side, and the party reached the saddle without mishap. Dropping down diagonally for a short distance across the northern slope descending from the saddle to the lower end of the ravine above mentioned, we entered the latter at 1.25 p.m. and commenced to climb. On the whole it was not difficult going, and a small pool of drinkable water near the lower end was a valuable find. Above this the ravine is characterized by a long rock-face overhanging the stream bed at a marked angle. At one point in the stream-bed foot- and hand-holds were few and far between, and we were glad to use the rope as an auxiliary. Thenceforward all was fairly easy going until about 100 feet from the summit, where a steep moss-covered bank afforded inadequate purchase for climbing. Ramon tackled this with help from below, and fastened the rope about 50 feet up: within a few minutes we were on the top (3680 feet) at 2.35 p.m.

We were rather aggrieved that our arrival on the summit should have coincided with the first shower of rain encountered on the trip. Visibility was not too good, and observations, photography, and sketching were all hampered to some extent. We were also impressed with the desirability of getting back towards our base before it became dark. Hours could have been profitably employed on making observations: we could not afford to remain for much more than an hour, and as visibility showed no sign of improvement, we started down at 3.50 p.m.

However, a very fair view of the range, both eastwards and westwards over the top of Peak Q (about 3550 feet) close by, which we conceived to be Allan, to Mount Escott and Copetilla in the distance—the former peak obscured by cloud—was obtained. One is inclined to think of the range at this point as nearly at an end, but the "thumb-nail impression" of the view to the west shows

what is not very clear in the photographs, namely its elongation westwards to Mount Escott and thence south-westwards to Copetilla. The photograph to the eastward shows rather strikingly the precipitous nature of the southern, as compared with the moderate inclination of the northern side of the range.

A paper with the signatures of the party was enclosed in a small glass medicine jar and, with a handkerchief, tied to a bush at the highest point. Short of building a cairn of stones there was no means of leaving a permanent mark, as any small object would soon become lost in the moss which covers the elongated summit knee-deep.

The descent and journey eastwards were made at our utmost speed, as no one particularly fancied the idea of a night of exposure on the peaks. Nevertheless dark caught us ascending the ridge described as M. An attempt was made to carry on with torches improvised from the dry leaves of the so-called Mexican Hat Palm, but after a time the trail was missed. All being somewhat exhausted, it was decided about 7.30 p.m. to accept the inevitable and settle down for the night on the trail. We were lightly clad, with no food and very little water: the ground was moist, and neither the prospect nor the reality was pleasant. Being "bushed" under normal conditions is an experience not necessarily attended by serious discomfort: at a height of nearly 3000 feet it is rather a different story. There was plenty of kindling material in the dead palm leaves, and bright illumination was obtainable by setting a match to the fibrous envelope of the palm trunks, which blazed up for a few minutes, creating a weird and peculiar effect. But fuel with which to make a permanent fire was lacking, and our first effort in this direction soon died out. Westby settled down under a heap of green palm leaves, marking his position to avoid being trodden on by leaving his hat on the top: he claimed in the morning that it had not been altogether effective for that purpose! Ramon lay in the open with his back to the dying fire. Both managed to get some sleep. We lay in the dark wondering how long we could endure the biting cold on our backs. Towards midnight we discovered simultaneously that we could stand it no longer, and the rest of the night was spent replenishing a small fire with fragments of palm-leaf stems, making expeditions into the bush every hour or so to collect fresh material. Dawn of the 19th was greeted with profound relief, and a rather exhausted party stumbled back to Greyfriars Camp, taking about an hour and twenty minutes to get there. A tin of beans providentially cached and some water from the water-hole dug on the evening of the 16th revived our spirits, and the journey eastwards was resumed. Shortly after the faithful Indians met us with water. They had waited patiently at the eastern face of Presumed Holland (H) until evening, and had returned to Ridge Camp to sleep.

Continuing, we descended the same face with the aid of our rope—the moss having by now been worn away by the constant traffic—and got into Ridge Camp about 9.15 a.m. The Indians had intelligently left some food there when removing camp to Lucky Strike, and we enjoyed our first square meal for over twenty-four hours. Feeling much better, we went down the ridge to Lucky Strike, bathed, and made up some of the deficiencies of sleep during the previous two nights.

Next day, March 20, the baggage was moved back to Pronto Camp by

relays, while we re-ascended to the ridge for the purpose of taking observations from the Hill of Pines (Peak B). This point of outlook gives an excellent view of the range as far as Peak P and of the surrounding country northward, southward, and eastward. We were lucky to make Pronto Camp that night, as it possessed a bush hut constructed during Stevenson's previous tour. The rain had so far held off throughout the tour, and we had been sleeping in the open; but it came down fairly heavily on the night of the 20th.

The horses were expected on the following day (21st), and it was decided to let the Indians go off to All Pines on the early morning of the 21st to enable them to catch the mail boat for Punta Gorda that evening. They started early and made the 25 miles to the coast in quick time, being eager enough to get home. While they did splendidly on the trip, they felt themselves in a strange country and were a good deal worried by the botlass flies, which were troublesome during sunshine even at high altitudes.

About 9 a.m. Alfred arrived with only two of the three horses. The third had got away from him when descending the hill on the 14th, and has not yet been found at the time of writing. This unfortunate circumstance is the only fly in the ointment of an otherwise satisfactory tour.

The journeys from Pronto to Vernon Camp (21st) and thence to All Pines and Belize (22nd and 23rd) were without noteworthy incident. Camp was made on the night of the 22nd at Cabbage Haul Gap with the object of ascending the slate ridge which runs parallel to the coast. From this it was hoped to obtain comprehensive views of the Cockscombs and of the lower valley of the South Stann Creek. Unfortunately, on ascending the ridge it was found impossible to secure a good point of outlook, owing to the man-high growth of Dumb Cane, bracken, and cutting grass, and the screen of Broken Ridge forest fringing the ridge. Through a small gap in the trees, however, a fleeting but wonderful glimpse was obtained of the Cockscomb peaks bathed in the red glow of sunset.

In the course of the tour all the peaks of the main range had been ascended except K, L, and Q, none of these being of particular importance from our standpoint. L and K could be reached, probably without serious difficulty, from M: the attainment of Q from the highest peak P might be a laborious business, and, as its summit is immediately overlooked from that peak and would not secure a materially wider view of the country to the west, there was no object in wasting time on it. Escott and Copetilla might be suitable objectives for a further expedition, but the best approach to them would not be *via* the main range. The highest point of the range was reached on the fifth day from the coast: by the route established it should be possible to make it in four days fairly comfortably. It might be done in three, but this would be rather strenuous.

2. *Possibilities of Economic Development and Transportation in the Region.*—It will be as well, in the first place, summarily to dispose of the idea that the Cockscombs *themselves* might be a suitable location for settlement of any kind. The range is merely a wall of disintegrating rock, flanked by the debris of this process of disintegration, and held together only by the vegetation which covers it. Disturbance of this vegetation would in all probability have serious results in the form of landslides and rockfalls.

There are limited quantities of mahogany on the lower slopes and ridges of the range which it might in favourable circumstances be profitable to remove by tractor-haul. The South Stann Creek is, however, anything but a good stream for driving mahogany.

In the lower part of the valley, say eastwards of a point about 20 miles from the coast, mahogany cutting has been carried on intensively, within the limitations imposed by cattle haul, for a long time back. A tractor was employed, it is believed for the first time in the valley, last year. It may be assumed that in this section the forests within easy reach of the stream have been over-cut beyond the possibility of repair, and that such wood as remains is situated on relatively difficult ground on the lower slopes of the flanking hills. Some idea of the length of time for which mahogany operations have been in progress can be gained from the fact that a truck-pass up the Cockscomb branch from its mouth near Vernon Camp, far up the river, is recognizable from the description of it in the report of the Goldsworthy expedition forty years ago.

There may be certain quantities of exploitable wood farther up the narrow valley of the Cockscomb branch than we had occasion to go. According to rough traverses in the forest office, mahogany operations seem to have been carried to a greater distance westwards up the southern branch of Sittee River, which is separated by a single range of hills from the Cockscomb branch of South Stann Creek, than they have penetrated on the latter branch. We may be fairly certain, however, that no large bulk of wood such as would justify a protracted operation or substantial expenditure on transport lines, exists on the northern branch of South Stann Creek.

The basin of the southern branch, however, to the westward of Vernon's camp, seemed, when viewed from the Cockscomb ridge, to merit further investigation. In marked contrast to the series of narrow, parallel, rocky slate valleys on the north, this basin, extending fanwise to the south-west and south, is characterized by the low, regular, and lenticular outlines of its weathered granite hills. While it may be much more broken than it appears from above, this country would seem to be of a type offering relatively few obstacles to railway or road construction. To what extent it bears mahogany and has been penetrated by workings it was impossible to judge. Unfortunately, the period at which the leaves of the mahogany turn colour was nearly over, and from the Hill of Pines only one belated tree was recognizable by its coppery foliage.

The basin extends westwards to a not very prominent divide approximately abreast of Peaks K and L, across which divide the Cockscomb branch of Swasey, a tributary of Monkey River, flows southwards from the base of the range. This stream apparently passes through a well-marked gap bearing south 21° west from the Hill of Pines. Beyond the catchment area of the Swasey-Cockscomb stream is an apparently steep range of (probably) slate hills on which a trio of peaks form a good landmark.

Looking out across this large expanse of not too broken country, the idea naturally suggested itself that here might be a conceivable way of tapping the mahogany resources of the Western Territory. As far as the range of slate hills the difficulties do not look particularly serious, and while the lower part

Peaks H, B, and Outlier from east summit of K *Phot. H. T. Grant*

Looking N. from trig. station K towards Middlesex *Phot. D. Stevenson*

Peak K from L; H, G, B, and Outlier beyond *Phot. H. T. Grant*

Knife Edge Saddle from L; N, O, and P beyond *Phot. H. T. Grant*

Peaks N, O, and P from L; Copetilla beyond *Phot. H. T. Grant*

Peaks N, K–L, B, and the Outlier from Peak O *Phot. H. T. Grant*

of the South Stann Creek valley, failing rapid development in the market for secondary woods, promises little in the way of forest production, it is not impossible that the upper part of that valley and the untouched forest of the upper basin of Swasey-Cockscomb, a stream reputedly rich in mahogany resources, might help to finance a logging railway having as its ultimate objective the Western Plateau. We know that the plateau itself offers no outstanding difficulty: the problem would be to negotiate the ascent of the slate range.

Much of this is of course pure speculation. Visibility from the Cockscombs was not good enough to form any clear opinion, save as to the desirability of further exploration to the westwards. It was decided to undertake as soon as possible a further tour, ascending Swasey-Cockscomb from the Monkey River side and returning via South Stann Creek. This would not only give an idea of the forest productivity of the little-known area at the headwaters of the two streams, but would provide an established trail on to which an offset can be subsequently dropped from Stevenson's north and south trail on the plateau of the Western Territory above, which cannot be more than 20 miles distant. Pending this further tour it is unnecessary to carry the discussion further, and from our point of vantage on the Cockscomb ridge we may turn back to the contemplation of the lower valley of the South Stann Creek.

It would be difficult to find a better illustration of the prevailing ignorance on the subject of the possibilities of agricultural development in the Colony than the fact that this obviously fertile valley has never been seriously considered as a potential site for agricultural expansion. Few people in the Colony have even heard of it. Nevertheless it is relatively easy of access: the main truck-pass passing into the valley through Cabbage Haul Gap, 400 feet above sea-level, would require little modification to provide a first-class road alignment. If it were a case of railway construction the South Stann Creek Gap might be a more suitable means of access, though the Cabbage Haul Gap would not be at all insuperable for a railway. Once over the latter gap the truck-pass runs almost on a level all the way to Vernon's Camp. Good gravel ballast would be obtainable from the river. The soil is the same type of deep fertile loam of mainly granitic origin which is found in the North Stann Creek Valley. In the aggregate there is probably a much larger area of land suitable for agriculture than has been opened up by the Stann Creek Railway. Save for the possible intrusion into the valley of the undemarcated back territories of the private estates on Sittee River, the land is the property of the Crown, and the vexed problem of speculative land-holding does not arise. The areas cleared for mahogany camps have become colonized with indigenous grasses of apparently high fodder value: a sample of one of these has been sent to the Imperial Institute to be tested for nutritive qualities. There is a small but apparently healthy banana plantation at Vernon's Camp. The valley is more sheltered than that of the North Stann Creek by the slate ridge running parallel to the sea which lies across its entrance. Altogether it is an attractive proposition from an agricultural or pastoral point of view, yet when has it ever been considered as such?

The most effective means of development would probably be by the agency of some private organization large enough to provide the necessary means of

communication. In any case the "grants and leases" system, which has had such unsatisfactory results in other parts of the Colony, and particularly in the Stann Creek Valley, should be rigidly excluded from the tract, which is obviously more suited for agricultural production organized on a large scale than to be broken into inefficiently cultivated small holdings. A long-term lease conditional on communications being provided and land brought into production at a certain rate would offer the most suitable form of tenure. "Convertible leases" of the Middlesex type are always attended by a certain danger that some lucrative but impermanent crop may be cultivated for a few years to fulfil the conditions of the lease, and that as soon as freehold has been attained less attention may be paid to production and more to speculative holding of the land on the lines with which the Colony is already so familiar. A long-term lease of the type suggested should include as one of its essential conditions the reversion to the Crown not only of the land but of the transportation system provided by the lessee in case of non-fulfilment of the requirements of the lease.

Some arrangement on these lines would be particularly desirable in case of any proposal to take up land in the valley for cultivation on a large scale of bananas of the Gros Michel variety. Despite the failure of this crop in the Stann Creek valley, it is not impossible that the intense pressure for banana lands to replace the large areas which are going out of cultivation owing to Panama disease in the republics south of the Colony might lead to some proposal of the sort. The sectional control system which seems to have been successful for example in St. Lucia, where Gros Michel is still cultivated on a not very large scale, in *retarding* the spread of the disease, might conceivably be applicable in the South Stann Creek basin. There would be no apparent objection to fugitive cultivation of the kind, if the reversion of land rendered unproductive by disease had been secured, and if in the meantime successful cultivation of some crop to follow the bananas had been established by experimentation on the similar soils of the North Stann Creek valley.

The type of transport to be adopted would depend on the nature of the agricultural crop to be grown and the prospects of providing supplementary timber traffic from the forests beyond the limit of cultivation. Timber and heavy agricultural produce such as bananas would call for a railway: if it were a matter of moving only light agricultural produce, *i.e.* produce with a high value-to-weight ratio such as cacao, a road would doubtless suffice. In the latter case the extension through Cabbage Haul Gap of the good ditched and drained pine ridge road connecting All Pines to Regalia by some 7 or 8 miles, of which the first 3 miles would be through pine ridge, would give access to the valley at its lower end. As indicated above, a railway would probably be best routed through South Stann Creek Gap, thereby avoiding the necessity of climbing some 400 feet to surmount Cabbage Haul Gap.

No indication was observed in the course of the tour of the presence of any mineral in paying quantity.

3. *Mapping.*—The accompanying map, made on scale 1/63,360, establishes with what we believe to be substantial correctness the relation of the Cockscomb Range to the sea coast. On the map of the range itself, plotted to twice the scale, sketch contours based on actual aneroid readings, ocular estimates, and photographs have been indicated (see map following p. 192).

The survey of the route between All Pines and Lucky Strike Camp was made with a prismatic oil compass and a cyclometer wheel reading chains. Mapping of that part of the range east of Peak K was carried out by compass and pacing, and the further topography westwards to Peak P was established mainly by intersections from known points.

We considered that control barometric readings in Belize would be less suitable than those obtained at All Pines, some 40 miles nearer the Cockscomb Range. H.E. the Governor kindly lent his large surveyor's aneroid for this purpose, and Mr. Jenkins, saw-mill engineer at All Pines, took the requisite number of readings daily in order to provide final corrections to the altitude figures obtained with two aneroids employed on the expedition. The only thermometer was broken on the second day from the coast. In the generally poor conditions of visibility, binoculars were found very useful in locating long-range landmarks distinguishable with difficulty by the naked eye.

Data derived from the photographs helped materially in the compilation of maps. The photographs showing the region to the south-west will have further value when the projected exploration of the Swasey Branches of Monkey River is undertaken.

4. *Identification of Peaks.*—The attempt to identify, in our mapping of the range, the peaks named by the Goldsworthy Expedition has cost us more labour than any other point of this report; and while disclaiming any wish to decry the achievements of that expedition, and any motive other than to disentangle the truth, one must admit that the method of naming peaks which were not ascended nor accurately located has had singularly unhappy results. It is hardly likely, in any case, that at this distance of time our conclusions are such as to hurt anybody's feelings. From our analysis of the narrative of 1888 it would appear, for example, that one peak, attempted from two different directions and ascended from a third, was named after each of the three members concerned, in apparent ignorance of its single entity. Again, the peak named the Molar, appearing in the profile in a part of the range in which there is certainly nothing answering to its description, received no single mention in the whole course of the narrative.

The only two peaks stated definitely to have been ascended are Jerningham and Victoria. We are inclined to identify the former by its description with the prominence marked E on our map, and, as indicated earlier in the report, have formed the conclusion, not necessarily final, that the peak climbed by Allan and Bellamy, and named Victoria, was not P, the highest point of the range, but the pinnacle K, which, viewed from the eastern end of the range, appears as undoubtedly its most prominent feature. To this theory there are two objections: firstly, the recorded height of the peak ascended, 3700 feet, which accords very nearly with our aneroid reading for P; and secondly, that if the party had been, as we suppose, on the summit of K they would surely have observed the much higher mountain mass of N, O, and P to the west of them unless that series of peaks was obscured by clouds.

It is somewhat remarkable that the account of the expedition should be completely silent on the subject of the view obtained westwards from their Victoria Peak. Not even Allan Peak, which if their Victoria had been identical with P would have been overlooked at close quarters, is mentioned, and the

peaks of Escott and Copetilla farther westward, which would have been seen under the apparently moderate conditions of visibility which obtained at the time of ascent, are ignored completely in the report. Their Holland Peak, described as immediately to the east of Victoria Peak and having an estimated altitude of 2500 feet, shows a resemblance to Peak H (2660) but none to Peak N (3320 feet) or Peak O (3450 feet). The altitude reading for the Victoria of the Goldsworthy Expedition seems rather suspect. The climb from the foot of the flue to the summit of P, a height of 500 feet, took us an hour and twenty-five minutes going all out; it is difficult to understand how Allan and Bellamy made a climb of something in the neighbourhood of 1000 feet in thirty-five minutes, and their subsequent descent of 700 feet in less than fifteen minutes seems equally remarkable. The highest peak in the range, P, has a flat elongated top. There are no "prongs," nor narrow ledges. The whole description of Victoria in the Goldsworthy Report seems to tally with conditions on K and L.

5. *Geology*.—It was not possible to obtain more than a general impression of the geological formations in the region during the limited time at our disposal. From All Pines to the range of slate hills in which the Cabbage Haul Creek has its source, and through which South Stann Creek and Sittee River have cut gorges to the sea, the coastal plain is characterized by arenaceous alluvial soils supporting a belt of pine forest some 4 to 5 miles wide. Above the gorge the wide basin of the South Stann Creek is of granitic origin, and the Cockscomb Range itself is a metamorphic contact zone having a thick capping of quartzite over granite. Actual contacts were not located, but quartzite formed the whole backbone of the range.

6. *Vegetation*.—In the mangrove swamps immediately behind the raised sea-beach at All Pines the typical flora includes *Rhizophora Mangle* L. (Red Mangrove), *Conocarpus erecta* L. (Buttonwood), *Chrysobalanus Icaco* L. (Cocoplum), and *Bucida Buceras* L. (Bullet tree).

Wet savannah forest, in which rushes and tall grass interspersed with clumps of *Chamærops tomentosa* (Palmetto) and *Crescentia Cujete* L. (Calabash) manage to survive inundation during the rains and fire during the short dry season, forms a narrow belt between the mangrove and pine forests.

As previously indicated, pine forests occupy the coastal plain across to the foot of the slate hills. The annual fires in this pine belt have reduced the type, in places, to dry savannah, and the ingress of hardwoods has been retarded except on stream alluvials. The associates of pine (*Pinus caribæa* Mor.) in this area are similar to those in other parts of the Colony, and include *Byrsonima crassifolia* (L.) DC. (Craboo), *Curatella americana* L. (Yaha), *Quercus spp*. (Oaks), and *Chrysobalanus Icaco* L. (Cocoplum).

From the edge of the pine forest to Cabbage Haul Gap the riverain vegetation is of a fairly advanced type and marked by the prevalence of *Attalea Cohune* Morris (Cohune Palm). Common tree species of this locality are *Terminalia obovata* (R. & P.) Eichl. (Nargusta), *Virola merendonis* Pittier (Banak), *Ficus spp*. (Figs), *Simaruba glauca* DC. (Negrito), *Schizolobium parahybum* (Vell.) Blake (Quam), and *Zanthoxylum Kellermanii* P. Wils. (Prickly Yellow). Of more scattered occurrence are *Spondias lutea* L. (Hog Plum), *Dialium divaricatum* Vahl. (Ironwood), *Vochysia hondurensis* Sprague

(Yemeri), *Miconia spp.* (Mayas), *Xylopia fructescens* Aubl. (Polewood), *Bursera gummifera* Jacq. (Gombolimbo), *Cecropia sp.* (Trumpet) and *Cyathea sp.* (Tree fern). The Royal Palm (*Oreodoxa regia* H.B.K.) occurs along the lower reaches of Cabbage Haul Creek and other palms include *Chamædorea sp.*, *Euterpe edulis* Mart. (Monkey Tails) and *Bactris horrida* (Pokenoboy).

On the Cabbage Haul Gap the forest stock contains a higher precentage of Tree ferns and Polewood, and *Oreodoxa oleracea* Morris (Cabbage Palm) with *Podocarpus coriaceus* Rich. (Cypress) appears on the summits of the hill range on either side of the Gap. Pine in association with Dumb Cane, bracken, Craboo and a species of *Clusia*, constitutes the chief soil cover.

The type of forest on the granitic alluvial soils of the upper South Stann Creek basin is not materially different from that mentioned in the last paragraph but one, an increased proportion of Banak and Ironwood was observed, and *Calophyllum Calaba* Jacq. (Santa Maria) occurs sporadically. Only one mahogany tree (*Swietenia macrophylla* King) was seen up to Vernon Bank.

In the more open forest on the ridges between the Cockscomb Branch of South Stann Creek and the Hill of Pines the principal species of the lower slopes are Banak, Nargusta, Ironwood, Hogplum, Quam, Cotton (*Ceiba pentandra* (L.) Gaertn.), Wild Tamarind (*Acacia sp.*) and Mammee Apple (*Calocarpum mammosum* (L.) Pierre). At 600 feet above sea-level Mahogany, together with Santa Maria, Gombolimbo, and Jug (*Mouriria sp.*), are represented, and persist until an elevation of some 1000 feet is attained. A few Botan palms (*Sabal excelsa* Morris) appear with the general growth of Monkey tail and Mountain Cabbage palms near the summit of Peak A, but the Cohune palm was not observed above 1200 feet.

The flora on the ridge between Lucky Strike Camp and Peak C includes *Symphonia globulifera* L. f. (Waika Chewstick), *Rheedia edulis* Tr. & Pl. (Waika Plum), *Licania hypoleuca* Benth. (Pigeon Plum), Cypress, Santa Maria and Polewood. Banak is present but tends to peter out at the higher elevations. The limit of Mahogany on the Cockscomb Range appears to be about 1650 feet above sea-level.

A typical tree or shrub of the higher ridges and peaks is a species of *Clusia* which finds root-hold on almost vertical moss-covered rock faces. The more important associates of this species have been forwarded to the Smithsonian Institute for identification. Reference has already been made to a palm, locally called Mexican Hat, which occurs with Mountain Cabbage in pockets of soil at elevations exceeding 2500 feet.

7. *Acknowledgments.*—We take this opportunity of recording our appreciation of the excellent work performed by Mr. Charles Westby and the Indians, whose energy and interest contributed so largely to the success of the expedition. Our thanks are also due to the Tidewater Lumber Company for co-operation in transport arrangements, and to Mr. Jenkins of All Pines for his able assistance in recording the readings of the base aneroid. We are indebted to Mr. G. A. Elliott, M.M., C.L.S., of the Surveyor General's Department, for his kindness in preparing the final copies of the maps of the expedition.

A SECOND COCKSCOMBS EXPEDITION IN 1928

HERBERT T. GRANT

IN 1927, when approaching Peak H of the map accompanying the foregoing paper from the south-east diagonally across the spurs on a compass-bearing towards K-L, it was not until a short distance below the gap between G and H that rock walls were encountered. In this area, at an elevation something over 2000 feet, the southern drainage emanated. Without examining the rock, the smooth rounded honeycombing led me to assume that the mass of the Cockscombs was limestone, the capping above this gap being of quartz and quartzite. My paper on this visit ("The Cockscombs Revisited," *G.J.*, December 1927) had already left my hands when Mr. Leslie H. Ower's "Features of British Honduras" appeared in the October *Journal*. It was Mr. Ower who pointed out to me that my statement did not coincide with the general geology of the region.* On this account I planned to pay the range a fresh visit in 1928.

Messrs. Oliphant's and Stevenson's notes on the geology confirm Mr. Ower's map. While circumstances prevented me reaching the point in question on this occasion, it is noteworthy that Bellamy, who accompanied the Goldsworthy Expedition as geologist and botanist, writes of "Goldsworthy Peak" (*Proceedings R.G.S.*, vol. xi, 1889, p. 548): "I collected specimens of the rock, a hard limestone with crystalline quartz running through it . . ." There appears to be a possibility therefore that limestone does outcrop in the range.†

Mr. Oliphant generously gave me a copy of the report of the Forestry Department Expeditions of February and March 1928, and in conversation with Mr. Stevenson and from his sketches and photographs much valuable information was derived which assisted me in April. They had explained their difficulties in endeavouring to correlate their results with the map of the 1888 expedition, and it appeared desirable that the Peak K-L should be

Note by Mr. Ower: In British Honduras there are two distinct limestones. (A) A blue crinoidal limestone interbedded with the Upper Carboniferous slates. (B) A massive white limestone of about Oligocene age, resting directly on the granite and slates. The limestone stated to exist on the Cockscomb ridge may conceivably be the blue beds. Limestone is not mentioned by either Wilson or Sapper, geologists who visited the Cockscomb ridge in 1886 and 1896 respectively. The former approached it from the south and the latter from the west. Although reaching to an altitude of 2500 feet on the western side of the Maya Mountains, the fringe of white limestone on the coastal side vanishes at a low altitude in the Cockscomb district. The presence of white Oligocene limestone at a high altitude in the Cockscomb ridge would not conform to the present ideas of the faulting on the coastal side of the Maya Mountains.

†I do not concur, however, with the forest officers' statement that "The range is merely a wall of disintegrating rock . . . held together only by the vegetation which covers it." On the contrary, the rocks are very hard and compact and will not fracture under a hammer. The quartz, which on this occasion I had ample opportunity to inspect, is a smooth glass, with here and there veins of a milky variety running through it, disappointingly empty of metallic indications. Only one place was found where the quartz showed extensively iron stainings or pittings; but an assay of a specimen proved unproductive. It is this very consistency which has enabled these bold residual peaks to endure while the softer rocks have weathered away, leaving for the most part only a low connecting saddle between the peaks and the high central *massif* K-L to P, which, with Allan and Escott, is the true "Cockscomb" as viewed from off the coast in profile.

climbed to see if that might throw some light on which peak was ascended by the Goldsworthy expedition, claimed by them to be the highest in the range, and named by them "Victoria."

My companions were Placido Tesecun, one of the Mayas who had gone with me the previous year, and a Kekchi boy, Francisco Kib. Leaving All Pines before dawn on April 17 and travelling light, we arrived on foot before nightfall at our "Last Camp," which, for one reason and another, it had taken us four days to reach on our first trip. This camp lies on a stream close above a series of lofty waterfalls. Being limited for time I continued on this rougher but shorter diagonal route, depending on Placido to be able to follow our last year's track. Unfortunately the trail was lost five minutes after leaving camp on the second morning, and, endeavouring to reach the gap between G and H by compass, we bore slightly too far westward, giving ourselves a bad climb up what must have been the south side of H, for, rock walls forcing us farther west, we emerged at 10 a.m. about midway on the saddle between H and K-L. We halted here to lighten loads, and then advanced along the saddle to Greyfriars Camp. From this point the highest peak (P) could have been climbed early this (the second) afternoon; but our objective was K-L.

We struck the place which had frustrated one of the forest officers' attempts to climb this peak—a bare quartz face, or, alternatively, a chimney with an overhanging roof. Our attempts to climb these were also abortive. Here we obtained a fine framed view looking down on H and points eastwards. Descending we skirted west along the rock wall, finding the only other break (also attempted by Oliphant and Stevenson) unscalable, and commenced the roundabout journey up the spur running from the north side of the Cockscomb basin up to the west of K-L. Nearing the top of this spur we obtained an excellent view of L. Oliphant and Stevenson believing the approach from M to be a comparatively simple one and the pinnacle now appearing insignificant in comparison with the lofty spires forming the east of K-L, we pushed on for the crest of the saddle, confident of accomplishing the ascent. Here for the first time I saw the highest group, N-O-P, to the west. Our confidence was shortlived, the saddle commencing to descend as we progressed eastward, and at a distance of a furlong from the pinnacle becoming a broken knife-edge with sheer precipices on either side along which it would have been foolhardy to attempt to approach farther. From the point of this knife-edge the pinnacle appeared an unbroken wall rising some 150 feet higher than our elevation of 2990 feet. It should be noted that the vegetation invariably appears much denser in the photographs than it actually is, and I am satisfied that even had we been able to reach the foot of the pinnacle it would have been barren of result, so sheer and inhospitable it rose above us. On the south side of the broken saddle L is a cliff for probably 2000 feet. It seemed then that if a route of approach were to be found it must lie somewhere up the rock-wall flanking the north side which we had already examined unsuccessfully. In my eagerness to follow the likely approach which had just baffled us I failed to observe what may probably be a comparatively easy road to the summit of L—the vegetated ravine running up the north face. We are beginning to learn, however, that nothing can be taken for granted in these mountains, and whether it can be reached across the fairly open stretch in the

foreground, or whether the precipice dropping from the knife-edge on the saddle intervenes, remains for some later comer to discover. As will yet be seen, any one wishing to ascend K-L will be well advised to investigate this route.

We turned back westward along the saddle, camping for the night a short distance from Peak N, which was reached at 6.40 next morning after an easy climb. Peaks O and P were completely hidden in mist. Descending, we followed the rock walls flanking peaks and saddle, passing two trails, which I assumed to lead to O, and driving our own *picado* on to a ravine with a running stream. We had gone some little distance up this when we encountered the forestry track leading into it, and knew we were on the proper route to Peak P. The climb was not particularly difficult. Reaching a point from which the summit could be seen about 100 feet above, Placido scaled a short moss-covered rock face without assistance: following, a large fragment of moss broke clear away from under my feet and I was left hanging without foothold, arms buried in the moss, until Francisco threw the rope up to Placido. Except at this point the rope was not used. From the altitude recorded here, 3620 feet (time 9.15 a.m.), I should have inferred that we were on the highest peak, although nothing was to be seen but the immediate summit, a sea of mist surrounding our feet. A handkerchief drew our attention to a little blue jar of the vaseline container type, with the signatures of the party which had been there on March 18. We added a slip of paper with our own signatures to the jar (April 19); Kib's mark being duly witnessed. There was sufficient light for photographs on the top, but, although we remained there for an hour and a half, the mist continued to blow about us, and in consequence neither Allan nor Escott were seen by us at any time on the trip. I have seen them only from off the coast. Lying south-west of the east–west axis of the range, Copetilla is visible from all the peaks.

I had intended tackling Peak Q (Allan), but the mist prevented observation of the distance and route of approach, so we retraced our steps eastward. Peak O had involved the forestry party in some difficult climbing, and in view of the obscurity I had decided to pass it by when, the mist clearing somewhat as we reached the westmost path, I was tempted to try it. We were gratified to find that the foresters had made the way so easy that a very few minutes took us to the top, where, the mist dispersing altogether, we had a good view in all directions, from elevation 3500 feet at noon. We took Peak N (3390 feet) in our stride.

Returning to Greyfriars, Kib was sent back to the saddle between K-L and H for blankets, bacon, and tea, left with our light hammocks the previous morning. We had had neither blankets nor fire the previous night, but we experienced no great discomfort from cold. There were light intermittent showers during the first four days and nights. Around this section for two days we had no water but that wrung from the moss and, on the lower saddle east of H, that drained from "wild pineapples"—really liquid mud. Placido and I again ascended to the chimney, which we reached at 4.45 p.m., but were no more successful in getting above it than before. I decided to spend the fourth day (the last one I could spare) hunting for a route west along the rock wall; but on descending from the chimney, scrutinizing the ground as

The highest peak, P, from Peak O *Phot. H. T. Grant*

Peaks O, N, L, and K from Peak P *Phot. D. Stevenson*

Summit of Peak P: handkerchief marks deposited records *Phot. H. T. Grant*

Phot. H. T. Grant

The southern cliff of pinnacle L from Knife-edge on saddle to the west

Phot. D. Stevenson

Peaks N, O, and P from M; Copetilla in the distance

we went, I noticed a promising way of ascent about 100 feet below the chimney and a short distance west of it. We went up it a short way without being checked, and then dropped down to Greyfriars optimistically resolved on a third attempt on K-L next morning.

This new line of approach was found to merge with the same seemingly insurmountable face and chimney. That these were eventually passed and also several other difficult places above it was due solely to the unfailing courage and resourcefulness of Placido Tesecun. The Maya will pack and cut uncomplainingly and untiringly for his dollar a day and food for as long as one keeps going, to all appearances as unimaginatively as a camel. He can be led but not driven, and to share and share alike with him is to discover a latent loyalty and sportsmanship as invaluable as unexpected. It pays to sit beside him at meals, to share cigarettes and discuss plans. He will do anything for you if you treat him as an equal: yet he will never presume.

The hard quartz face afforded only the meagrest of holds, and it was dripping with moisture from the moss above. Attempts to scale it had only resulted in shaking my nerve; but Placido was still undaunted. He knew how much I prized attaining this peak, and added to that was his own desire to go one better than his brother Ramon, who had described this spot to him and who, for the time at least, had had his fill of mountaineering with the Forestry expedition. "No go: lef' it," had been his advice to Placido. But the Maya is a man of his word, and Placido had promised to accompany me. Ten yards or so to the right (west) of the chimney was the end of a very narrow ledge running out of sight round a corner. Round this Placido wriggled on his stomach and disappeared. I called to him and he replied encouragingly, and a few minutes later he reappeared, peering down through the top of the chimney. It seemed only a matter of getting the rope hitched to some convenient tree, but a place could not be found to drop it plumb, and, on commencing to climb, one only swung off the rock face. Accordingly Placido partially descended the ledge and succeeded in throwing the rope to me. He then practically dragged me and Kib in turn round the corner and up the ledge, which sloping downwards and outwards was, even with a thick carpet of moss increasing its width, no more than 2 feet wide and so overhung that there was just room to wriggle our bodies through. Below this ledge there is a deep straight drop. As a rule the trees screen the depths to which one would fall—for this north side also is very steep—and one requires no head for heights. Although not accustomed to mountain country, Placido climbed ahead barefooted like a cat, again and again fixing the rope for Kib and myself. When at last we encountered the distinctive vegetation and characteristic gentle incline near the summit of all these peaks we found we had emerged on the east end of K, from which we looked almost directly down on H. This was heartening, for we were tired, and from both east and west the south-eastern "prong" K looks the higher.

We were taken aback on the actual summit, therefore, to find that the north-western "prong" L showed distinctly higher, and that an uninviting approach via the hummock, discernible between the "prongs," separated us from it. This hummock is like a great moss-covered mushroom, exquisitely pink. My impression had been that the moss on the rock faces was not so colourful at

this time as it had been in May 1927; but this hummock was gorgeously tinted. Descending about 50 feet and working round the south side of this hummock proved to be a simple matter, and, Placido leading the way as usual, the ascent of one last "nasty" little "face" brought us on to L. From here looking back K showed higher. Actually these summits are of equal height—3150 feet. The varying height of the vegetation is partly responsible for this illusion. Between it and the moss in which one sinks it is not easy to say which is the highest point of any of these peaks.

We left on one of the more open places on the top a cylindrical tin, in which Placido carried matches, with the date, April 20, and our names, and on a twig beside it an empty metal film container. This peak K-L consists of two flat ridges in echelon, each about 150 yards long and much narrower than the similar summits of N, O, and P. In places the level parts of its tops are only 3 or 4 feet wide, but one can walk along them comfortably without risk. From every part of these the peaks N, O, and P show up boldly a little over a mile away, unmistakably much loftier, as one would expect at this short distance, P being 500 feet higher. Running up to the centre of the table-top L from the north is one of these vegetated clefts by which these peaks are climbed, and which I take to be the outlet of the ravine already described. Nevertheless, much as we disliked descending by the route we had come, we judged it wiser to drop down to Greyfriars over known ground. Five hours were spent on these summits, and it was 4.40 p.m. before we started east from Greyfriars.

I had intended following the foresters' route up the west side of H; getting photographs of K-L from my vantage point of last year; dropping down below the gap between G and H for rock specimens; and continuing from there to Last Camp with a view to reaching All Pines next day. Unfortunately, we must have struck one of the Indians' *picados* which avoided H, for when we reached a spot sufficiently clear to see about us, H had been left far behind. We camped between F and G, and, the moss smouldering unnoticed beneath our fire, a pit about 20 feet wide caved in during the night, nearly engulfing us. Neither water nor soil being available, our attempts to put it out were unsuccessful, and later in the night we were forced to run for it. We climbed Peak B next day on our way to a point on the Cockscomb Branch a mile or two above Anthony's Barquedier. All Pines was reached in the late afternoon of April 22. Since we had not a scrap of food left, water coconuts from the "walk" at Lopez Bank, referred to in my first paper, were very welcome. At 5.30 next morning the forestry launch *Lolette*, calling at All Pines on its way north, comfortably assisted me to complete the trip to and from Belize in exactly one week.

Topography and Identification of Peaks.—The expedition to the Cockscombs in 1927 I rightly termed a visit, and the original map accompanying the paper was headed "Map of the Cockscomb Mountain Range as viewed from Holland Peak." This point (H) permitted a view only of the striking peak K-L, and M on the saddle west of it; G and B, and the "Outlier," which belongs to a separate system and which in the poor visibility appeared as a mass corresponding to the Bellamy-*Molar*-Goldsworthy group (see all photographs looking east) of the 1888 map. Copetilla was also seen and bearings

taken on it as a distinctive hill; but it was not known to be a "continuation of the quartzite contact of the Cockscomb" until Mr. Ower's "Features of British Honduras" appeared, and so was not included in my map. These points seemed to correlate with the Goldsworthy Expedition's map, and were named in my map accordingly. The height of K-L was taken from the Goldsworthy map also, and since the south-eastern prong is, ocularly, about 100 feet higher this difference was shown. From the north-west corner of Peak H, the saddle connecting it with K-L is not apparent, and I believed a "bottle-neck" some 1500 feet lower than the summit of H separated H from K-L. Similarly, looking from the east side of H, where points in that direction become visible about 200 feet from the top, the saddle running the length of the range was not seen. Messrs. Stevenson and Oliphant are to be congratulated on their excellent presentation of the topography of the range, which until their expedition had never been established.

In attempting to identify the peaks there are two accounts that may be drawn from. Neither Wilson nor Sapper is of any assistance. Wilson, in 1886, two years before the first exploration, approaching from the south, reached "the gap between the second (highest) and third points from the west," *i.e.* presumably between O and P.* Sapper saw the highest peak from Allan (Q) and assumed it to be Victoria, since the Goldsworthy party had claimed to have ascended the highest peak and so termed it.†

Jerningham's "Report" was written up from what Bellamy, Allan, and Wickham told him. He had no technical knowledge, and was not with the party which completed the ascent of Victoria. The account of Bellamy (*Proceedings R.G.S.* 1889) is to be preferred, as he was present in a scientific capacity and was one of the two white men who reached the top of Victoria. Jerningham's (Gordon Allan's) and Bellamy's maps are the same, except that Bellamy does *not* show the insignificant peak on the contour to the west of the Bellamy-Molar-Goldsworthy group as being surmounted by pines. "We (p. 548) . . . reached the top of the ridge, 1250 feet, and found ourselves close under a peak bearing due south, with a few pine trees growing on the top. *This was named Bellamy Peak.* We climbed it to a height of 1800 feet. . . . We saw Victoria Peak, the highest of the range, bearing west by south . . ." On p. 549 there is a sketch of "Victoria" peak from this point in which C, F, G, H, J, K, L, and what is probably P can all be identified. A photograph (p. 124), taken from the top of this peak (B), shows the same points. Although called by Oliphant and Stevenson the Hill of Pines, B is clearly Bellamy. I think it may be inferred, therefore, that the summit a short distance to the east of B, although really a continuation of the same hill, is Goldsworthy. The "Molar" does not appear to exist at all.

The Goldsworthy party seem to have had no clear idea what point was what, which is perfectly understandable, as, in the screening bush, it is only occasionally and from high altitudes that views are obtainable. It is possible that, looking east from P or K-L (whichever of these peaks they attained) they

*Notes on River Surveys, by G. H. Wilson. Printed at H.M. Prison, Belize (undated —*circa* 1887).

†*Petermanns Geograph. Mitteil.*, Erganzungsheft No. 127, 1889: "Ueber Gebirgsbau und Boden des nördlichen Mittelamerika," p. 30.

observed and incorporated in their map either the "Outlier" from K-L or K-L itself from P. Both of these resemble a "molar." From Bellamy's sketch (p. 549), although peaks appear plainly therein to the west of K-L, it is fairly evident that from this point K-L was mistaken for the highest peak. This is quite conceivable. Except from the neighbourhood of B the peaks to the west of K-L are hidden from the east by the latter. It is clear, too, that the group H-K and L is the western culmination of the 1888 contour (Allan excepted), which would mean that H is their "Holland" Peak, as I assumed last year. Somewhere between Bellamy and Holland is their unimposing Jerningham, 2000 feet. Both aneroids being out of commission after the descent from K-L, I was unable to obtain readings east of there, but, placed by them nearly 2 miles east of Holland, it is probably E as Oliphant and Stevenson conclude, although the distance is exaggerated.

Journeying north-west from the slopes of B, Bellamy camped that night "in a ravine under the main peak of the Cockscombs" at an altitude of 1000 feet. From this point the description is so confused, Jerningham being reached three days later after Wickham had found a route to the summit of Victoria (p. 549) "by climbing round the heads of spurs," that one might conceive M to be Jerningham except that their altitude is short 1000 feet. Victoria was climbed four days after leaving Bellamy. "The top of Mount Victoria is a thorough peak, with but little room for moving about. . . ." (p. 550). If Bellamy and Allan ascended P one can understand Bellamy's silence regarding peaks (lower) to the west. Yet I agree with the forestry officers that his description does not fit peak P. But it is quite incredible, peaks N, O, P looming close at hand ("Montagua and Omoa, *in Spanish Honduras*, were seen towering above the rest"), that they could have climbed K-L and believed it, *from the summit*, to be the highest peak in the Cockscombs. It will, to my mind, remain a mystery what they climbed and named Victoria.

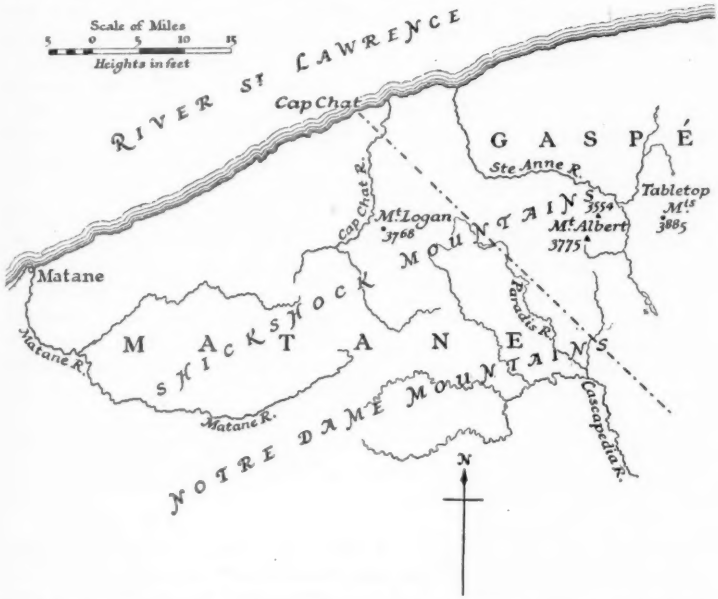
Since it was the evident intention of the Goldsworthy expedition to give the name Victoria to the highest peak, it seems fitting that P should hereafter be known by that name. The peaks then may be named as follows :

(1) Summit east of B—Goldsworthy.
(2) B—Bellamy.
(3) E—Jerningham (so inconspicuous that the name might well be dropped).
(4) H—Holland.
(5) K-L—The Watchtower (suggested).
(6) N and O (require to be named).
(7) P—Victoria.
(8) Q (Allan), Escott, and Copetilla are all recognizable.

A SKI ASCENT OF THE SHICKSHOCKS

CAPTAIN B. J. MARDEN

ON 12 January 1928, at 10.30 a.m., I left Matane in Matane County, Quebec, and skied the 50 odd miles along the coast to Cap Chat. Matane is the end of a light railway, and the road to Cap Chat runs along the coast, continuing through Gaspé around the peninsula. I reached Cap Chat at 3.30 p.m. on the following day, after passing the night at a farm. At that time I believed Mount Logan to be the highest peak in the Shickshocks. It was shown as such on my big-scale map, and I was given the same information locally. I accordingly hired a hunter, by name Ustazade Thibault, and in spite of considerable local misgivings as to the possibility of making the trip



on skis, we proceeded up the trail to the lumber camp, Nec Tor, where we were royally entertained by M. Gonjon of Richardson's Lumber Company. I had my skis and Ustazade his snowshoes. There was no doubt as to the superiority of the skis upon the trail, or in the open. They were half as fast again. Ustazade was, however, waiting for Mount Logan. He told me afterwards that he was quite convinced I could not make the trip.

The next day we left the camp and attacked Mount Logan from the west. We had chosen the western approach from Cap Nec Tor on the Cap Chat river, in preference to the eastern approach from a mill on the Petit Cap Chat river, on the advice of the local hunters. There were 7 miles of thick wood to be covered before the ascent proper. I was told that a storm had uprooted most of the trees. There certainly seemed to be plenty left, but at any rate the

storm accounted for the fallen timber. There was not sufficient snow to cover the tough undergrowth, and the skiing was therefore none too easy. Even with sohm skins there were parts of the climb where I had to pull myself up by the bushes; and here the snowshoes had the advantage. After leaving the trees, we had to climb a steep gulley to a col from which we (or rather I) ran down into the trees again before the final ascent to Mount Logan. The gulley was unpleasant, and I had to cut steps with the B.B. binding irons on the toes of my boots. Ustazade had moccasins, which were not suitable for icy gulleys. I also noticed that skis are superior to snowshoes on hard steep surfaces.

Just below the top of Mount Logan we passed through an interesting ice formation. Snow had apparently melted on the trees to such an extent that they had lost all resemblance to trees, looking more like half-melted candles. We didn't wait long on the summit. There was a bitter wind, in which I got an ear frozen, in spite of two hats, and the guide his feet. We had a good view of Mount Albert to the east and the Notre Dame Mountains to the south, but we hadn't much time for extended observations. The run back was interesting from the skiing point of view, but extremely difficult. Fallen timber and thick brushwood, in combination with steep slopes, provide a remarkable test of technique. We reached camp in plenty of time, however, and the next day skied the odd 20 miles back to Cap Chat.

There is an interesting account of the Shickshocks by A. P. Coleman in the Appalachian Mountain Club *Bulletin*, Vol. 18, No. 4, of December 1924, and a more technical geological account by the same author published by the Canadian Department of Mines, Bulletin No. 34, Geological Series, No. 41.

There is also a single map sheet, good looking and presumably accurate, on a scale of 1 inch to the mile, of the Mount Albert-Table Top area, published by the Geological Survey of Canada, Ottawa. In this several of the Table Top peaks are shown as over 4000 feet, so that the supremacy of Mount Logan must be regarded as a fiction of the past. [*Note:* The sheet bears in its margin the warning that the heights engraved are now known to be 220 feet too high; but it remains true that there are summits at the extreme east of the range higher than Mount Logan.]

Very soon after the author of this paper had communicated it to us he left England for a ski-expedition to Aconcagua. In the Times *of August 11 it was reported that he was missing and that his camp had been found empty. Some weeks ago, when this paper was put into print, we learnt with regret that nothing more had been heard of him, and that there was only too much reason to presume his death on the hazardous enterprise which he had undertaken alone. Unfortunately these fears were confirmed by a Reuter telegram from Valparaiso, published in the* Times *of December 20, which stated that Capt. Marden's body had recently been found at 14,000 feet on Aconcagua. Capt. Marden was an expert ski-runner, and the above slight account of a deliberate comparison between ski and snowshoes will have value for other winter travellers.*—ED. *G.J.*

A SECOND JOURNEY AMONG THE SOUTHERN TUAREG; NOTES ON SCIENTIFIC RESULTS: *being a supplement to the narrative of the journey printed in the January Journal*

F. RODD, P. RODD AND A. COURTAULD

1. THE meteorological data obtained in 1922 and 1927 are being examined by the Meteorological Office of the Air Ministry. The instrumental observations on both journeys consisted of daily maximum and minimum temperatures, twice daily wet and dry bulb readings and aneroid barometer pressures, the water temperatures of some deep wells, and in 1927, rainfall measurements, barograms, and thermograms. Notes were kept daily of wind direction, cloud formations, and other phenomena including sunrise and sunset effects. Data were collected regarding daily atmospheric pressure variation.

2. Some fifty skull measurements of Tuareg and other anthropological information were collected. This and most of the ethnological and historical material will be published only when it has been collated with other extant material and compared with results obtained in 1922, which have in part been incorporated in the author's 'People of the Veil' (Macmillan, 1926).

3. The negatives of several hundred photographs taken on the two journeys and all the lantern slides made therefrom are deposited at the R.G.S.

4. Field sheets of routes and adjoining country in Aïr itself were prepared on a scale of 1/250,000 both in 1922 and in 1927. 24 sheets were drawn in 1922 and 17 in 1927. The country was mapped by route traverses with watch and prismatic compass, based on astronomical observations for latitude, longitude, and azimuth. The methods used are described in Appendix I. In 1927 a field wireless receiving set was employed for ascertaining G.M.T.; the results of this work are given in Appendix II. A small area of mountains was roughly triangulated. The astronomical positions determined are given in Appendix I, with the 1922 results (when G.M.T. by W/T was not available) corrected to 1927 data.

5. A limited number of heights ascertained by boiling-point observations are given in Appendix III.

6. A limited amount of geological material collected is being examined by Professor Gregory at Glasgow University. The results will be published in due course.

7. A considerable number of rock drawings and inscriptions were copied and much linguistic and epigraphic material was also collected. The results will be published as and when ready in the publications of such societies as are interested in the material. Some preliminary notes are contained in Appendix IV.

8. Some botanical notes available are being considered by the Royal Botanical Gardens at Kew.

9. All the notes made on all subjects in 1922 and 1927, as well as the originals of astronomical and other computations, route traverses, and maps, are at the R.G.S.

APPENDIX I. ASTRONOMICAL POSITIONS AND TRAVERSES

1. In 1922 astronomical positions were fixed by stellar observations with a 3-inch vernier theodolite, and differences of longitude determined by half chronometer watches from positions previously ascertained by earlier French travellers. Such longitude differences were in most cases computed by starting from fixed positions and returning either to the same position or to other fixed positions. The longitudes thus determined were therefore dependent on the accuracy of the starting and closing positions. In one or two instances longitudes

were determined in this manner at intermediate points where previous French data also existed; the results so obtained coincided sufficiently well with the latter to satisfy one that the new positions were of the same order of accuracy. Thus in 1922—

	° ′ ″	° ′ ″	
Tin Wana	16 42 55 N.	8 25 15 E.	Rodd
	16 42 32	8 25 19	Cortier
Auderas	17 37 50	8 19 00	Rodd
	17 38 00	8 18 14	Foureau
Iferuan	19 04 10	8 22 45	Rodd
	19 04 28	8 22 22	Cortier

Nineteen positions were thus determined in 1922. The latitudes were based on the means of one or more pairs of north and south circummeridian stars (or sometimes Polaris in the place of a north circummeridian star); the longitudes were based on pairs of east and west stars, the errors of the half-chronometer watch in use being distributed equally through the time which had elapsed between leaving the one fixed position and returning to the same or to another previously determined French position.

2. In 1927 astronomical positions were determined by the same types of stellar observations taken with a 3-inch micrometer theodolite reading to 10″ of arc by divisions and single seconds by estimation, with this difference that G.M.T. was ascertained for each observation by reception of Bordeaux and Nauen wireless time signals as described in Appendix II. In view of the fact that some of the same ground was covered in 1927 as in 1922, and notably because some of the basic points assumed as accurate from French data in 1922 were recomputed from W/T time longitudes in 1927, it has been possible to correct the 1922 longitude positions to the newly found basic positions. In the annexed table the final positions as corrected are given with a note stating whether the longitudes shown are by absolute (*i.e.* W/T) time or by differences of time from positions fixed by W/T time signals.

In 1927 in some cases the means of several sets of north and south, or Polaris, and east and west stars were available for determining final positions. When latitudes computed in 1922 were redetermined in 1927 the later results have been accepted owing to the greater accuracy of the 3-inch micrometer theodolite then available. Only one set of observations in 1927 was made by the 3-inch vernier theodolite, namely at Kurdidifi.

The time elapsing between the face R or face L sights varied between 2 minutes and 45 seconds. Each computation was made by taking the best three pairs of sights out of four or more pairs recorded. W/T time signals were received during, or just before, east and west star observations and again wherever possible 12 hours later (Bordeaux 8 p.m. and 8 a.m. signals).

All the astronomical positions determined are probably correct within a circle of 250 yards' radius. Some of them are more accurate. Compared with French positions in Aïr for points thus determined in 1927 it was found that the latitudes were virtually identical, whereas the longitudes were some 2′ to 5′ of arc farther east. The French positions, so far as is known, were all determined by transport of chronometers. They are remarkable for their accuracy compared with each other, and also for the preponderance of western error compared with the W/T time longitudes.

3. Intermediate country between astronomically determined positions was mapped by prismatic compass and time traverses dependent for their accuracy on (i) accurate estimation of camel-marching speeds, (ii) frequency of compass bearings.

W/T apparatus on the march: frame aerial, gun-case, and water-skin are on second camel

Riding camel, with chronometer pouch slung below saddle bags

UNIV. OF MICH.

W/T set in use

Rock drawings at Tajberat, Tin Wana

Experience gained in 1922 showed that a loaded camel caravan's marching speed varied in ordinary circumstances between 2·5 and 3·0 m.p.h., the speed occasionally rising to 3·25 m.p.h. over good firm desert and falling to virtually nil in rough mountainous sections in Aïr. In traversing a route, speeds were estimated to 0·2 m.p.h. Estimates were checked from time to time by counting the number of paces of measured length per minute and subtracting 5 per cent. The accuracy of such estimates is surprising and is commented upon later. Riding-camels without baggage train march at walking speeds up to 6 m.p.h. when pressed, but can keep up a mean of 4·5 m.p.h. on average stony country in Aïr. Trotting is rarely resorted to in Aïr by natives and never by the French Camel Corps in the Southern Sahara. Times were kept by a large eight-day travelling watch with a 3-inch face and recorded to the nearest minute.

Bearings were taken by liquid prismatic compasses (Army pattern) with radium illumination. The accepted methods of time and compass traverse by which sights are taken on prominent and relatively distant points whence, when they are reached, check sights back are taken, were discarded owing to circumstances. In nearly all the country covered these prescribed methods proved inapplicable: in the bush country of Damergu there are no recognizable landmarks, and visibility is often limited to a few yards: in the steppe desert south and east of Aïr there are very few landmarks, and natives are notoriously vague about the exact points where dunes or hollows will be crossed: in the 'serir' desert east of Aïr there are no landmarks at all: in the Aïr mountains visibility for traverse landmarks is either too low if in a valley, or too high if on a ridge and if the trend or configuration of the valleys is to be mapped. It is moreover difficult on the march with or without a caravan continually to stop a camel to take bearings. Instead of forward and check sights from a stationary position sights were taken from riding-camels in motion. Even with liquid compasses a stationary needle was thus rarely obtained. The bearings were estimated to the nearest degree at the centre of the swing of the needle. To compensate for the lack of accuracy due to the absence of back bearings for check and to the movement of the camel from which the bearings were taken, sights and times were recorded at very frequent intervals, sometimes as often as every two or three minutes. In bush country on many days twenty to twenty-five bearings (or more) per hour were recorded; the same rate was observed in complicated mountainous country. Lateral sights in mountain country on prominent features were also taken, the points of such features being subsequently plotted to the mean place of intersecting bearings, the routes *not* being adjusted by resection (save when there was reason to suspect an obvious necessity to do so) to make all the bearings coincide. Where possible, back bearings were taken, but this did not occur frequently. Traverses were recorded in traverse books ruled on one side of the page only, so that at each opening one blank page was available for notes and topographical sketches.

4. This method of traversing connotes great attention on the march and much labour and care in plotting, which was carried out on a scale of 1/250,000 by means of dividers, a circular protractor, and a diagonal scale specially ruled to convert m.p.h./minutes into linear distance. The scale carried the times marched in minutes (single minutes for the first quarter of an hour and then by five minutes for 60 minutes in all) on the vertical, and speed from 1 m.p.h. to 5 m.p.h. by 0·25 m.p.h. along the horizontal top side. Route traverses were plotted on squared paper to facilitate setting the protractor. Our rule was that each individual taking the traverse plotted his route as soon as possible, making primary adjustments where obvious errors had arisen, and sketching in the country at once from notes and memory. These sections of routes were then

pieced together and adjusted to astronomical positions. Such adjustments were made uniformly over whole sections between astronomical points or in individual sections as considered best in consultation. Adjustments were made arbitrarily when some error was believed to have occurred, or otherwise by rectangular projection.

5. Traverses recorded and plotted in the manner described showed closing errors on astronomical points exceeding 4 per cent. on only two occasions; more usually the errors were in the order of 1 per cent. The traverse of 130 miles to Tarazit starting from one astronomical position at Tegidda Mellen and ending at another not far removed (*i.e.* returning very nearly to the same point) closed with an error of 2 miles. By an intermediate traverse between the outward and the homeward routes this error was reduced without recourse to the astronomical positions determined, to $\frac{3}{4}$ mile, which was finally eliminated by adjustment to the latter data. Similarly accurate results were obtained on the long traverse from Auderas around the southern and eastern sides of Bagezan. The two worst traverses were made in the exceedingly rough country around Auderas, when, however, a rough triangulation of the principal summits in the area was available to correct them.

6. Traverses taken, plotted and adjusted in the manner described were made over 1650 miles of route in 1922 and 1415 miles in 1927, in all a total of 3065 miles.

7. A small rough triangulation of the country round Auderas was made. A short base was measured with 100-feet steel tape on the only piece of level flat ground near Auderas: the usual corrections where appropriate were applied. Independent measurements carried out by two persons showed only $\frac{1}{2}$ inch difference between them. This base was extended and twelve prominent points in the neighbourhood were intersected and computed. Among these points were Mount Todra, which by this means, by sketch-maps made during several ascensions, and by several local camel traverses, was shown to be an independent massif separated from the Bagezan group by a deep low-lying system of valleys. The height of the highest point of Mount Todra above Auderas was computed separately by theodolite and by differences of atmospheric pressure, the two measurements giving respectively 3460 feet and 3463 feet, a total height of say 6100 feet above the sea. (See Appendix III.)

8. The data deposited at the Royal Geographical Society consist of

(1) Sheets 1/250,000 field maps on R.G.S. field graticule projection (24 sheets for 1922 and 17 sheets for 1927).
(2) Traverse books and notes.
(3) Original and corrected plots of traverses, sketch-maps, and sketches.
(4) Observation books and original computations, astronomical and other.
(5) Daily record of observations and work done.
(6) Instruments, history sheets and records, including lists of instruments, notes on their behaviour, etc.
(7) Meteorological notes (the original diaries are with the Meteorological Office).
(8) Journal de Route describing each day's march and the country visited.
(9) Geographical notes and conclusions about general configuration.
(10) Geological notes.
(11) Anthropological data, notes, and various historical material.
(12) Copies of rock drawings, epigraphic and linguistic material.

ASTRONOMICAL POSITIONS

	° ′ ″	° ′ ″		
Katsina	*13 00 06 N.	*7 37 35 E.	R. '27	Long. by W/T
„	13 00 42	7 37 31	T.	
Dan Kaba ..	*13 12 40	*7 44 30	R. '22	Long. by diff. of time between Kano and Tessawa (R. '22)
Tessawa	13 45 36	7 58 32	Ch.	See note on F.'s long.
„	*13 45 50	*7 59 15	R. '22	
„	13 45 21	7 59 13	T.	
Urufan	*14 04 50	*8 06 25	R. '22	Long. by diff. from Tessawa (R. '22)
„	14 04 36	8 01 02	Ch.	
Kurdidifi	*14 31 12	*8 27 34	R. '27	Long. by W/T
Gangara	*14 36 26	*8 30 08	R. '27	Long. by W/T
„	14 36 50	8 25 40	R. '22	Long. by diff. from Tessawa
„	14 36 42	—	Ch.	
„	14 36 42	8 27 32	F.	See note on F.'s long.
Teshiasko ..	*14 59 36	*8 17 32	F.	„ „
Sabankaffi ..	*14 38 36	*8 42 14	F.	„ „
Tasr	*14 54 45	10 44 59	N.	
Tanut Post ..	*14 58 20	*8 52 18	R. '22	Long. corrected to Gangara (R. '27)
Guliski	15 00 50	9 10 48	R. '22	„ „
„	*15 01 50	*9 12 24	N.	
Tasker	*15 07 30	*10 43 23	N.	Long. corrected to Gangara (R. '27)
„	15 07 40	10 39 38	R. '22	
Tigefin	*15 10 38	*9 52 37	N.	
T'inawgarakan ..	*15 18 13	*8 16 07	R. '27	Long. by W/T
Tadelaka	*15 31 04	*7 57 20	N.	See note on F.'s long.
„ ..	15 30 12	7 53 14	F.	
Tegema	*15 39 37	*9 16 14	N.	
Inasamed	*15 30 58	*8 50 08	N.	
Termet	*16 04 10	*11 09 18	R. '22	Long. corrected to Gangara (R. '27)
Anusud	*16 03 21	*8 07 29	N.	
Tagedufat ..	*16 06 08	*8 24 09	N.	
Abalemma ..	*16 16 32	*7 47 44	C.	C.'s long. used, but probably too far W., as are his others
„ ..	16 16 42	7 43 26	F.	
Timbulaga ..	*15 49 06	7 45 02	F.	
Marandet ..	*16 22 20	*7 24 14	C.	See note on C.'s long.
Ain Ir'ayen ..	*16 26 40	*7 56 02	C.	„ „
„ „ ..	16 27 30	—	F.	
Milen	*16 28 51	*8 29 23	N.	
Tabzagur ..	*16 36 57	*7 08 32	C.	See note on C.'s long.
Tin Wana ..	*16 42 02	*8 27 29	R. '27	Long. by W/T
„ „ ..	16 42 32	8 25 44	C.	
„ „ ..	16 42 55	8 25 19	R. '22	
Tebehic	*16 47 32	*8 21 14	C.	Long. inconsistent, probably too far W.
In Gall	*16 47 08	*6 54 20	C.	See note on C.'s long.
Eghalgawen ..	*16 48 21	*8 31 44	C.	Long. inconsistent, probably too far W.
Zherbubu	*16 53 15	*7 47 14	N.	
Agades (Fort) ..	*16 59 15	*7 59 10	R. '27	Long. by W/T

	° ′ ″	° ′ ″		
Agades (Rest house in city) ..	16 59 19	7 57 20	C.	
„ (wells at Fort) ..	16 59 12	7 53 26	F.	
Tin Dawin ..	*17 00 07	8 26 44	C.	See note on C.'s long.
Tin Taboraq ..	*17 01 50	8 08 44	C.	„ „
Tegida n'Adrar ..	*17 04 13	*7 22 56	C.	„ „
Anu Areran ..	*17 15 27	*7 43 53	C.	„ „
Fagoshia	*17 16 01	*6 57 32	C.	„ „
Tegida n"Tagait ..	*17 17 44	*7 24 33	N.	
Tafadek	*17 23 32	7 55 44	C.	As above
Tegida n"Tisemt..	*17 25 38	*6 35 14	C.	„
In Tassit	*17 26 27	*0 03 20	N.	
Wadi Tinien ..	*17 26 54	8 09 02	F.	See note on F.'s long.
„ „ ..	17 26 24	—	Ch.	„ „
Idikel	*17 29 42	*7 38 08	C.	See note on C.'s long.
Teloas-Tabello ..	*17 34 40	8 55 22	R. '22	Long. by diff. from Auderas corrected to R. '27
Egerwen	*17 35 15	7 55 02	C.	Long. not used : probably too far W.
Auderas	*17 37 38	*8 24 52	R. '27	Long. by W/T
„	17 37 50	8 19 00	R. '22	R. '27 long. of Auderas and Iferuan used to correct R. '22 long. of Teloas, Tellia, Abarakan, Assode, Afis and Fodet
„	17 38 00	8 18 14	F.	See note on F.'s long.
In Aridel	*17 45 19	*4 24 53	R. '27	Long. by W/T
„	17 45 26	4 20 50	C.	
Tellia Valley Pool	*17 47 30	*8 53 24	R. '22	Long. by diff. from Auderas and Iferuan corrected to R. '27
Tamaia	*17 48 36	*5 29 26	V.	
„	17 48 47	5 24 38	C.	
Tanekert	*17 48 44	*3 11 00	R. '27	Long. by W/T
In Kakan.. ..	*17 49 22	*7 49 08	C.	See note on C.'s long.
In Abbangarit ..	*17 53 47	5 59 17	C.	
Tamet-Tedderet..	*17 54 04	*6 36 38	C.	As above
Anu n'Ageruf ..	*17 54 46	*7 25 02	C.	„
Aureran	*17 56 54	8 23 14	F.	See note on F.'s long.
„	17 56 42	—	Ch.	„ „
In Nuguren ..	*17 58 54	*5 17 33	R. '27	Long. by W/T
Teginjir	*17 59 20	—	R. '22	
Abarakan.. ..	*18 03 30	*8 41 36	R. '22	Long. by diff. from Iferuan corrected to R. '27 Iferuan
Timeras	*18 08 14	*2 15 33	R. '27	Long. by W/T
Aggata Well ..	*18 09 00	*8 32 32	R. '22	Long. by diff. from Auderas : corrected to R. '27 Auderas
Ufa Atikin ..	*18 09 26	7 12 50	C.	See note on C.'s long.
Battal	*18 11 24	*6 10 42	R. '27	Long. by W/T
In Allaran ..	*18 16 12	6 15 47	C.	See note on C.'s long.
„	18 15 24	6 19 14	V.	
Tamadalt Tan Ataram.. ..	*18 16 23	7 49 38	C.	As above
Afasto	18 17 08	7 18 02	C.	See note on C.'s long.

	° ′ ″	° ′ ″		
Afasto	*18 17 07	—	N.	
Zilalet	*18 23 39	7 51 56	C.	See note on C.'s long.
Tadet n'Kutat ..	*18 21 40	*6 10 32	N.	
Tintaralle ..	*18 26 30	*8 56 05	R. '27	Long. by W/T
Kidal	*18 26 07	—	N.	
„	18 26 06	1 22 32	V.	
„	18 25 51	*1 20 56	C.	
Assode	*18 27 00	*8 28 56	R. '22	Long. by diff. from Iferuan : corrected to R. '27 Iferuan
R'arus N.	18 27 54	1 41 44	V.	
„	*18 27 46	*1 42 00	N.	
Sidawet	*18 30 54	8 02 50	C.	See note on C.'s long.
Afia	*18 37 30	8 37 56	R. '22	Long. by diff. from Iferuan : corrected to R. '27 Iferuan
Agellal	*18 43 02	8 07 32	C.	See note on C.'s long.
„	18 43 00	*8 10 02	F.	See note on F.'s long.
„	18 43 00	8 07 14	Ch.	
Fodet	*18 47 20	8 37 06	R. '22	Long. by diff. from Iferuan : corrected to R. '27 Iferuan
Arli	*19 00 05	*7 38 22	R. '27	Long. by W/T
In Tadreft ..	*19 03 46	*6 32 01	N.	
Iferuan (House near Fort)	*19 04 48	*8 25 01	R. '27	Long. by W/T ; position about ½ mile N.E. of Fort
„ (Fort) ..	19 04 10	8 22 45	R. '22	Long. by diff. from Auderas
„ (Rest house)	19 04 28	8 23 02	C.	See note on C.'s long.
„ (Fort) ..	19 04 18	8 24 32	F.	See note on F.'s long.
„ „ ..	19 04 12	8 12 20	Ch.	
Tegidda Mellen ..	*19 12 09	*8 21 10	R. '27	Long. by W/T
Zurika	*19 14 35	7 50 20	C.	See note on C.'s long.
Uraren	*19 31 44	*7 08 32	C.	„ „
Ingezzam	19 33 10	5 44 30	C.	„ „
„	*19 33 10	*5 43 16	N.	
„	19 37 48	5 46 26	V.	
Teggert	*19 43 07	*5 59 06	N.	
Asamakka ..	*19 20 42	*5 37 52	N.	

R. '27 = Rodd 1927
R. '22 = Rodd 1922
N. = Nieger 1912
C. = Cortier 1909–10
V. = Villatte 1908–9
T. = Tilho 1906–9
F. = Foureau
Ch. = Chambrun
} Foureau-Lamy 1898–1900

NOTE

The wireless longitudes of the 1927 expedition show Cortier's longitudes to be west of their true position. At Agades and Tin Wana the error is about 2 minutes of arc, increasing to the westward. The wells of In Allaran (13 miles east of Battal) are more than 6 minutes too far east, and although French authority accepts Cortier's position for this place the previous determination by Villatte is more correct.

Three positions in the Fade country and two north of Auderas fixed by the Foureau-Lamy Mission 1898–1900 have not been included, the identity of the observation spots being uncertain as they were only camping-places of the Mission in wadis. The longitudes by Foureau and Chambrun were determined by occultation of stars and eclipses of the satellites of Jupiter.

The R. '22 longitudes, by chronometric differences, agree within a minute or so of the position obtained by R. '27 route traverse adjusted to R. '27 wireless longitudes.

Nieger's observations of Karagoa and Bullum have been omitted from the list as these places cannot be in the positions assigned to them.

Positions marked thus * have been accepted in the compilation of Mr. Rodd's maps.

F. R., A. C., P. R.

APPENDIX II. TIME AND TIME SIGNALS

1. Nine timepieces were carried: R.G.S. Chronometer No. 8, R.G.S. Half-Chronometer watches Nos. 22 and 28, R.G.S. stop-watch No. 36, two wrist watches, two good English pocket watches, and one 8-day travelling watch with a large dial. The latter and the R.G.S. chronometer and watches alone survived the journey.

Graphs of the rates of Chron. No. 8 and Half-Chron. Nos. 22 and 28 were kept and have been deposited at the R.G.S. All three instruments worked satisfactorily, but there was no ascertainable method in their variations of rate, which occurred as disconcertingly when at rest under unchanging conditions as on long periods of march under uniform disturbance. We concluded therefrom that observations dependent for their results on rating over periods of more than five days, however careful the calculations and however uniform may be the conditions of transport or rest on such journeys, must be considered wholly unreliable.

The split-second stop-watch sometimes lost as much as 0·2 second in 30 minutes when the stop-hands were running. In L.M.T. observations allowance was always made for such error by checking the stop-watch against the Chronometer in use both on starting and stopping the big hands.

2. For Chronometer errors 107 W/T signals were taken from LY (Bordeaux) and POZ (Nauen). The Half-Chronometer watches were rated from W/T signals directly and not from the Chronometer. It was generally found practicable to rate the Half-Chronometers on the preliminary automatic and the Chronometer on the rhythmic signals in the same set. The former had their errors ascertained to 0·1 and the latter to 0·01 second of time.

3. The invoice details of the W/T set were as follows:

MARCONI RECEIVING SET R.P. 11

	Nett.	*Gross.*	*Size.*
Iron Trunk No. 3 ..	88 lbs.	110 lbs.	32″×15″×11″.
	1 Receiver, Type R.P. 11 PS 2630A No. 330109.		
	16-volt inert cells, 805.		
	3 Inert cells, Siemens, 59.		
Iron Trunk No. 4 ..	86 lbs.	112 lbs.	34″×17″×13″.
	1 Battery and spares box PS 2641A No. 330412.		
	3 Inert cells, Siemens, 54.		
	12 Valves, Type D.E.3.B.		
	2 Pairs telephones, Brown's L.R.		
	2 Egg insulators.		
	50-feet aerial wire 16/3/36.		
	1 Length of 2½-amp. flex.		
	10 feet No. 18 bare copper wire.		
	2 Battery fillers.		
Wooden Case (no number)	16 lbs.	35 lbs.	47″×19″×6″.
	1 Frame aerial, Type R.P.11. PS 2639A No. 330161.		
	4 Keys for travelling trunks.		

4. The set worked satisfactorily throughout the journey. The open aerial was not used, but various tests made on the way out to West Africa convinced us that atmospherics in the Sahara were such as to favour the use of the frame aerial in all circumstances. 8 a.m. (Bordeaux) was the best time for working with very little interference. At noon (Nauen) and 8 p.m. (Bordeaux) atmospherics were frequently very bad, but Bordeaux rhythmics were nearly always loud enough to be observed very satisfactorily with the earphones off the head. Nauen was never so good. The range of the set was surprising. Cayenne and several North American stations in the west and Saigon in the east were picked up.

The selectivity of the set was not quite so good as claimed, and owing to a small defect the tuning settings which had been calibrated at a determined H.T. voltage on the frame aerial before leaving England changed completely soon after starting. There was virtually no diminution of strength of Bordeaux signals with the frame aerial oriented any way between north-east and north-west. Although the set was designed to work only on wave lengths between 14,000 and 22,000 metres, Nauen short wave and a local French station working on 2300 metres a few hundred yards away from the receiver were on occasion heard. But these may have been anomalies.

The set was equipped with four valves of the same pattern (Marconi D.E.3.B.); they survived the whole journey. Eight spare valves carried were never used. Subjected to rough usage and some severe falls, the apparatus was uninjured though the frame aerial box required strengthening. The set required one camel to transport though one and a half camels were used, the frame aerial being a light half-load on a small beast. The receiver and battery box, carried each in their own iron trunk with spares and other equipment, constituted one good camel load.

The Siemens dry batteries in the apparatus as it left England were used the whole time. The inert spare batteries were never brought into use. Though designed to work with H.T. 96 volts the receiver was found to give completely satisfactory results at 60 volts in spite of the fact that the minimum pressure laid down by the designer was supposed to be 80 volts; Bordeaux was received on as low H.T. as 18·5 volts.

The wastage of the batteries is shown in the following table:

	Volts.			
	H.T. Battery.		*L.T. Battery.*	*Grid Battery.*
	Block A.	*Block B.*		
Full	66	66	4·5	1·5
June 12 ..	61·6	61·8	4·4	1·45
Aug. 31 ..	60·5	59·2	4·2	1·35
Dec. 7 ..	57·8	49·8	4·3	1·3
Jan. 10 ..	56·9	49·8	4·2	1·3
Loss in 9 months	9·1	16·2	0·3	0·2

One 6-volt H.T. unit failed owing to the block cracking on account of a fall or heat. Great heat was experienced, including three weeks with the shade temperature ranging round 110° F. The tin trunks were exposed to the full heat of the sun on the march and in camp. Thermometers inside the cases recorded 140° and 150° F.

A full report on the working of the apparatus with some suggested minor improvements has been made to the R.G.S. A. C

APPENDIX III. HEIGHTS ABOVE SEA

Boiling-point observations were made with the usual hypsometric apparatus and computed above sea-level, using Isobars and Isotherms supplied by the Meteorological Office for certain months in the areas concerned. The heights of peaks in the Todra massif were computed by aneroid and theodolite observations as differences of height above Auderas camp at Teda Inisilman village. The height above sea-level of the camp itself was computed by boiling-point observations, the result being based upon a mean of eight sets of readings on different days.

Boiling-point observations were invariably taken as nearly as possible at the times of greatest or least diurnal pressure variations, and corrections for such variation from Angot's tables (in the *Barometer Manual*, published for the Meteorological Office, by H.M. Stationery Office) were applied for the appropriate latitude.

Heights above Sea-Level by Boiling-Point Computations

		feet.	
Katsina Rest House	..(mean)	1660	
Gangara Rest House	.. „	2057	
Tin Wana (Kerbubu Pool)	.. ..	2218	
Auderas (Teda Inisilman village) ..	(mean of 8)	2641	=805 metres (798 metres: Foureau)
Todra Massif peaks above Auderas:			
Peak Ghobitan (P_3 a),	3270 by Theodolite ..	=5911	
	(3246 by Aneroid ..	=5887)	
Main Peak ..	3460 by Theodolite ..	=6100	
	(3463 by Aneroid ..	=6104)	
Whale back ..	3096 by Aneroid ..	=5737	
Fanta Pool ..	609 by Aneroid ..	=3250	
Emilial Pool	..	3667	
Towar Village (River-bank at)	..	3327	
Telleichina Valley-bed	..	3656	
Tintaralle Well	..(mean)	3149	
Tegidda Mellen Pool	..	2150	=655 metres (700 m. Foureau)
Arli Valley Camp	..	1543	
Battal Pool and Wells	..	1149	
In Nuguren Wells	..	1270	
In Aridel Wells	..	1152	
Tanekert Well	..	1205	=367 metres (386 m. Meunier's map)

F. R.

APPENDIX IV. ROCK DRAWINGS

During my expedition in 1922 I had copied a certain number of rock drawings, but the short time at my disposal and the necessity of devoting most of it to geographical work prevented me from making a systematic study. On my return in 1927 the interest they aroused decided me to devote more time to them in the future if the opportunity arose. When I returned in 1927 I suggested to my brother that he should undertake to copy all the inscriptions which could be found. This proved impossible, as they turned out to be far more numerous than they seemed at first sight. Nevertheless our collection if not exhaustive may at least be said to be characteristic. The drawings were copied and in some cases also photographed in order that the accuracy of the drawings might be gauged. The photographs show the rocks covered with a dark patina chipped

or rubbed to appear lighter in the lines and on the surfaces which have been worked.

More competent persons will no doubt in time undertake the critical study of their archæological and ethnological connotation, but it may be useful here to summarize some of my brother's preliminary conclusions.

The Tin Wana, Tajberat and Tegidda Mellen rocks are comparatively soft sandstone. The others are granite or similar igneous rocks. On the latter there are no "rubbed" or "scratched" glyphs, and all the compositions are more elaborate and self-conscious than on the sandstone. The sandstone glyphs are always in great profusion. Some of the work is good, some careless, and some unfinished, though the bad wearing qualities of the rock surface probably accounts for most of the apparently "unfinished" ones. In some cases falls have displaced the surfaces on which drawings were found, but it would be difficult to date them on this evidence.

The classification is purely topographical. Some surfaces include a large number of inscriptions of obviously different styles and dates which have not been disentangled.

In connection with the T'ifinagh inscriptions it is worth noting that all those at Tin Wana pool begin either with | : · (: | : ·) or . . ., the latter always accompanying a preceding | : · inscription. | : · : | : · * is the formula still common to-day for beginning a letter or an inscription. It has not been possible to ascertain the meaning of . . ., but a guess may be hazarded that it gave some indication that the following name was a patronymic or rather a matronymic, since names beginning with + and therefore usually feminine are seldom found following | : · and in nine cases out of ten following . . . Since the Tuareg is matrilineal it would be natural to give his mother's name after his own.

The Tajberat inscriptions are similar to the Tin Wana pool writings, but the Upper Tin Wana and the northern inscriptions differ considerably. Three letters common in the north are missing in the south. Names are preceded by a different formula of introduction. The problem is all the more puzzling because the letters which are missing in the south are in common use among the modern Tuareg of Aïr while the introductory formula in which these missing letters are used in the north is incomprehensible to them, and for modern epigraphy the southern formula is used. It should be noted that one of the letters missing in the whole body of southern inscriptions is the *ieb*, one of the commonest letters in the T'ifinagh alphabet. The *ghain* ⵖ of the modern Ahaggaren Tuareg, on the other hand, is never found in Northern Aïr, though frequently in the south, while the Aïr Tuareg use a different symbol to-day, presumably to avoid confusion with the *ieg*, an inverted form of the *ghain* used by the Ahaggaren.

From this it is clear that the differences between the four alphabets mentioned, *i.e.* Old Northern Aïr, old Southern Aïr, modern Aïr, and modern Ahaggaren, are as marked as their kinship with each other is obvious. They are certainly all Tuareg alphabets, as may be deduced from historical evidence. The accepted distinction therefore between the so-called "Libyan" and the Tuareg alphabets, based as it is on discrepancies far less marked than exist between alphabets admittedly within the Tuareg group, seems to become somewhat artificial. It would seem safer to call the "Libyan" Old Ahaggaren, and await new light on the ethnology of the authors. Even if exceptions were found, these discrepancies are of sufficient importance to excite speculation. It would be interesting to know of other sites where inscriptions of the Tin Wana pool variety occur and their geographical distributions.

* *Nekku, wan nekku*="I," "that man who is I."

The figures present a bewildering variety. An attempt has been made for purposes of comparison to distinguish a certain number of types, which however are not watertight and merge into each other. In the notes accompanying the plates, the figures are in some cases distinguished by an index. This should convey the distinctions. The *J* horses are usually rough and impressionistic in execution but show a greater appreciation of form than the other classes. The *H* horses show a sense of anatomy which is missing in the *R* horses; the latter are as a rule carefully executed and formal in style. The "rocking" horses are also well cut but highly conventionalized in outline, though effective in conveying movement and spring. It is difficult without much more evidence to fit these classes into an evolutionary relation to each other as intermediate types occur linking each one to every other one.*

The Mamanet figures and those at Farazekat reported to be like them are sufficiently different in technique from the others to need special mention. The white surface in this case has been achieved not by a series of hammered dots but by scraping and rubbing. The result is a rough inverse relief, as the photographs show. In the case of figure 4 my brother inclines to the view that it was treated in this manner after it had already been completed in the style of the Aruh drawing, as what he believes to be traces of a hammered outline remain. In the case of the other figures he found no such traces.

The last observation I must make is about the drawings of camels. They are few and far between and occur principally in the far north, as at Tarazit. In all cases they are obviously of more recent date than the other drawings near them.

It is perhaps worth noting the prevalence which runs through all the periods and styles of the triple-plumed headdress in the human figures and the frequency of the "Libyan" lock. This is sometimes on the left and sometimes on the right, often on both sides. Its omission is rare in any figure drawn in sufficient detail or on a large enough scale to show it.

In conclusion, all that remains to be expressed is the hope that the publication of these drawings will stimulate a discussion which may throw light on these problems.

F. R., P. R.

*These glyphs have recently been exhibited at the Society's House.

IRISH ARCHAEOLOGY

THE ARCHÆOLOGY OF IRELAND. By R. A. S. MACALISTER, Litt.D. *London: Methuen* 1928. 9×6 *inches;* xvi+373 *pages; sixteen plates and twenty-two illustrations.* 12*s* 6*d*

IRELAND AND THE FOUNDATIONS OF EUROPE. By BENEDICT FITZPATRICK. *New York: Funk & Wagnalls Co.* 1927. 9×6 *inches;* xviii+451 *pages; and map.* $4.0

PROFESSOR MACALISTER'S book is the fullest and best description yet published of the antiquities of Ireland, prehistoric, early Christian and mediaeval. The interest of the work is specifically Irish, as the author makes little overt attempt to connect the early inhabitants and cultures of Ireland with those of the Continent or to follow out trade-routes. But the waifs and strays of wandering civilizations which have been found beside more permanent settlements are described, and have a geographical interest. The author emphasizes the fact that prehistoric Ireland was not, like England, an island of the North Sea, but an island of the Atlantic.

The earliest traces of man in Ireland—Asturian and Campignian implements—occur in the north-eastern corner, the only flint-bearing district, and there are some slight reasons for believing that man first entered the country near this point. But the conjunction here of two civilizations which elsewhere are widely separated, being known only in Northern Spain, Northern France, and Scandinavia, with traces of an earlier civilization—the Azilian—occurring at Oronsay, on the opposite coast of Scotland, provides a most interesting problem. Still, implements are likely to be first discovered in flint-bearing districts, and much exploration has yet to be done in Ireland. Dr. Macalister believes that the earliest inhabitants of Ireland were of the same race as the Picts of Scotland, mainly on the ground that both had a matriarchal system. This theory is the best yet put forward, and it is supported by the presence of *Cruithni* (the Irish form of *Pretani*, one of the oldest names for the inhabitants of these islands) in considerable numbers in Ireland in historic times. The *Cruithni*, or Picts, were always regarded as a separate race. The Iverni, however, who are also mentioned in ancient sources as inhabiting Ireland and are shown on Ptolemy's map, were also regarded as a distinct race in historic times.

It is now generally held that the earliest relations of Ireland were with the Iberian Peninsula rather than with France, and to the already considerable evidence for this Dr. Macalister adds a jar-burial, similar to those at El Argar, discovered near the Munster coast, and some Neolithic lozenge-shaped javelin blades similar to types found in Portugal. The value of his statement that the sculptures at Clonfinloch prove relations with Spain in Neolithic times cannot be judged, as his theory is based on photographs which have not been published; but his interpretation of the sculptures is by no means convincing.

The indications of intercourse between Ireland and the Iberian Peninsula cease early in the Bronze Age. On the other hand, there is some slight evidence that relations with Scandinavia began somewhat later in the Bronze Age and continued into the early Iron Age. Dr. Macalister, however, mentions no intercourse with Scandinavia before the Viking period; nor does he refer anywhere to the so-called "Irish earth-holes" (souterrains) of Iceland.

The Irish forts, which are very numerous and very varied in type, are of general interest, since analogies to most of the types occur on the Continent. But Dr. Macalister, who deals very ably with them, shows that little information of value can be obtained from them without further research. Indeed, climatic and animal foes probably had as much influence as the progress of culture upon their construction. The Irish souterrains—which are here fully described and

classified for the first time—also have their analogies abroad, but nearer home; their connection, if any, with the *fogous* of Cornwall is a subject worth Dr. Macalister's investigation. The parallel which he draws between the lake-dwellings of the "Celtic" invaders and the castles of the Normans is very apposite. He believes that the "Celtic" invaders (he rightly puts the name in inverted commas) landed on the south-east coast, probably attracted at first by the gold of Wicklow.

One very important theory is put forward in the book,—that Roman capitals were in common use for writing in pre-Christian Ireland. Unfortunately, it is not based, so far as the present writer can see, on any valid reasoning.

It is much to be regretted that this work, which is of the first importance for archaeologists, is not illustrated by a single map.

While Dr. Macalister shows us the prehistoric Irishman at home, full of an insular conservatism which steadily subdued and absorbed every imported culture and race, yet possessed of an instinct for style and a dislike of incompleteness which brought him to a high state of civilization, Mr. Fitzpatrick introduces us to the mediaeval Irish monk, strong in his faith, his learning, and his quick wits, striding across Europe, upsetting theologians and scholars and organizing a new culture by mere force of personality. Dr. Macalister is a patriot, but a scientist; Mr. Fitzpatrick is a poet who has been stung by the slanders of anti-Irish writers into writing a patriotic thesis.

In this book the author endeavours to show that the culture—and in some respects the civilization—enjoyed by France, Germany, the Netherlands, Switzerland, Austria and Northern Italy before the Renaissance was founded and built up by the Irish missionaries and scholars who flocked to the Continent from the sixth to the twelfth century. For him the Ireland of that time was the centre, not only of Christianity, but of learning for Northern Europe. He has prodigious knowledge and a glowing style, and his book is to be recommended as a very well-written popular account of a wonderful and little-known branch of history. His pages are full of great figures, great ideals, incessant labour. Here are Clement and Dungal, the friends of Charlemagne and Lothar and teachers in the Palace School; Alcuin, Dicuil, Eriugena, Sedulius Scotus,—intellects that would have shone in any age; St. Fursa at Peronne, St. Donatus at Florence, and a host of others, founding communities and schools, forming monastic libraries, everywhere toiling in the cause of learning.

There is no doubt that these men, with their practical enthusiasm, their organizing ability, and their contempt for outworn rules, helped to infuse new life into the schools of Europe; and to them, as Mr. Fitzpatrick points out, is due in great measure the revival of the study of Greek, in which they were well versed. But they did not stand for Ireland (Mr. Fitzpatrick includes some scholars who never saw Ireland, but were trained by Irishmen), their influence on the political and social life of the countries in which they settled was small, their Irish successors were less remarkable men, who came out in steadily decreasing numbers, and even without the well-known adaptability of the Irish abroad, they must quickly have been absorbed. When Mr. Fitzpatrick speaks of an Irish Empire and Irish Colonies, as he often does, we feel that he is spoiling a good book. On his map he shows as the "Area of Irish Cultural Activity" the whole of the British Isles, Iceland, the Færoes, and all Europe from Nantes across to Budapest, from Lucca up to Flensborg, while his "Area of Irish Cultural Activity and Political Settlement" comprised Ireland, Iceland, the Færoes, all Scotland, all Wales, and all Western England from Hexham to Exeter. If this was the Empire, it was an empire without *imperium*. E. L.

OLD CORNISH BRIDGES AND STREAMS. By CHARLES HENDERSON and HENRY COATES. (Cornish Studies, No. 1.) *London: Published for the University College of the South-West, Exeter, by Simpkin, Marshall & Co.* 1928. 7×5 *inches;* x+134 *pages; illustrations and maps.* 3*s* 6*d paper;* 5*s cloth*

This is a very interesting book, and a model of its type: well written and produced, and full of accurate information acquired by personal visits and the study of original records. "No work of man," say the authors, "is more delightful to the eye than a venerable stone bridge," a statement which wins ready assent: and the industry and enthusiasm of both writer and illustrator will induce many to take up their quarters at Launceston, Bodmin or Collington so as to see for themselves what, in all likelihood, their successors two generations hence will have no chance of seeing. For the fear is well founded that the concrete level bridge of motor roads will speedily displace the highly picturesque mediaeval stone bridge with narrow (often pointed) arches, angular buttresses and recesses, and steepish rise to the centre. These pages are intended to be a memorial of the latter kind of bridges when they shall have perished. Meanwhile the motorist who can leave the car and take to his feet will have a rich treat in store if he will follow Mr. Henderson and Mr. Coates as guides. The latter contributes fifty-eight good photographs which whet the appetite. The text is arranged in two parts, of which the first deals with Cornish streams, the building, architecture, chronology and names of the bridges; the second is an ordered and exhaustive survey of the bridges and streams from Tamar Head round the Land's End to Bude. The chief rivers of the south are Tamar, Lynher, Fowey and Fal; the only considerable river of the north is the Camel running out to Padstow, with the Hagh to the west as a bad second. The oldest names in Cornwall are nineteen proper to streams, and of course they are Celtic, many common to Goidelic and Brythonic. This book is to be recommended for many other merits which we have not space to detail. S. E. W.

SOME CONTRIBUTIONS TO THE ECONOMIC HISTORY OF WALES. By EVAN J. JONES. *London: P. S. King & Son* 1928. 9×6 *inches;* 197 *pages;* 9*s*

In this volume Mr. Jones has compressed an account of the main facts of the economic history of Wales since the sixteenth century A.D. into 188 pages. Within these narrow limits he includes surveys of its agriculture and the enclosure movements, of the growth and changes in the absolute and relative magnitude of the chief industries—woollen, iron, other metals, coal—and of labour conditions, including a study of the truck system and the unrest and agitations resulting from its abuses. The last two chapters deal with shipping and ports, and with changes in the distribution of the population. There are no illustrations of any kind.

It does not appear that Wales as a whole has ever formed a distinct economic region within Great Britain. There is such a region developed on the South Wales coalfield and its associated coastland; but North Wales is economically as well as physically closer to Lancashire than to Glamorgan. And the author's endeavour to treat Wales as an economic region often leads to unsatisfactory groupings. But to those whose knowledge of British economic history provides an adequate framework this volume will provide a useful summary of information relating to Wales and its industries. C. B. F.

THE ROMANCE OF THE YORKSHIRE COAST. By H. L. GEE. *London: Methuen & Co.* 1928. 7×5 *inches;* xiv+206 *pages, and illustrations.* 7*s* 6*d*

The ever-swelling army of tourist travellers is causing a great output of books in which the scenery and history of regions of counties are described; at the

opposite poles of which are the succinct guide-book and the rather verbose book full of scenic raptures in which "the level rays of the pale sun silver the grey sea and paint the southern side of the bare trees with thin gold." The wonder and romance found everywhere in everything "beggar description," but the author holds on, enamoured above all things of the sound of his sentences. The tendency of Mr. Gee's book is towards the latter type. He is a capable writer and a close observer, and can narrate well *e.g.* stories of heroism at sea; but one wishes he could prune his facile eloquence. His purple passages on the pageantry and enchantment of external nature are apt to pall. A guide may be too garrulous. There is no map. S. E. W.

GREAT BRITAIN FROM ADAM SMITH TO THE PRESENT DAY: An economic and social survey. By C. R. Fay. *London: Longmans* 1928. 9×6 *inches;* xii+458 *pages, and* 2 *maps.* 12*s* 6*d*

For the general reader and for the first-year university student this book is likely to become the standard work on the Economic History of Great Britain during the Industrial Age. For more detailed studies it will always be necessary to refer to more specialized works; but here the student will find all the chief developments of the period placed in due relationship to one another, down to the present day. After an introductory chapter on Adam Smith, the book consists of four almost equal parts dealing respectively with I Fiscal Policy and Finance, II Trade and Transport, III Agriculture and Industry, and IV Life and Labour.

Part I contains a clear account of the stages by which Britain became a Free Trade country by the last decades of the nineteenth century, and of the chief modifications in that position during the present century. In Part II the chapters on Ports and Merchant Shipping, Roads and Canals, and Railways and Motor Transport are of special value to the student of economic geography; and the same may be said of the studies of Agriculture and the Textile Industries in Part III. But it is in the last section that Professor Fay deals with studies which he has specially made his own, in the consideration of the effects of these economic developments on the people—at one end on their numbers and the resulting problems of distribution and of emigration, at the other on their voluntary organizations in Trades Unions and, especially, in the Co-operative Movement. These last sections contain much matter that will be new to most readers, and are particularly valuable to those whose knowledge of working-class organizations has been mainly gathered from the general press. Throughout the later parts of his work the author makes frequent and useful comparisons with conditions in Canada and the United States. If at times the reader may wish that he had given more attention to some aspects, such as emigration, for dealing with which he has special advantages, that only proves his success in holding an even balance amongst his sections—an essential feature of a good text-book.

There is a good index, but only three diagrams, two of which are diagram-maps. That inserted as an end paper shows England and Wales with county boundaries, overprinted in red with the railways of 1843; it contains several small errors—Stamford is in Lincolnshire, Trent Junction is in Derbyshire and north of the river, Lake Windermere is in Westmorland, though all three are shown on the wrong side of the county boundaries. This map should be re-drawn. A few similar errors occur in the text—as in the reference, on p. 191, to the Darlington *end* of the S. and D. R. (which actually ran from Shildon to Stockton with Darlington as its central station : some of the stone sleepers referred to were still to be seen three years ago on an abandoned section near

Shildon) and in the placing of Shilbottle in Yorkshire (p. 430) instead of in Northumberland. But these are small blemishes and can easily be removed in the second edition, which is likely soon to be needed. C. B. F.

ON THE PILGRIMS' WAY. By D. P. CAPPER. *London: Methuen & Co.* 1928. 8×5 *inches;* x+84 *pages; illustrations and maps.* 5*s*

Several authors have written on the Pilgrims' Way, among them Mr. Hilaire Belloc, Mrs. Ady Cartwright, and Mr. Elliston-Erwood, but there is no doubt that the final word about its direction in places between the crossing of the Wey near Guildford and Harbledon near Canterbury has not been said. Many hundreds of people have probably walked its 120 miles, or an approximation to it, and among them is the writer of this notice, who, like Mr. Capper, made the journey in April. Mr. Capper adds nothing to our knowledge of the route, but aims at describing the Way as it now exists. This he does very sketchily. He gives us a light, fanciful general account, couched in much picturesque and semi-poetical language, with poetical interludes. It must be said that the author seems happy in his dreams and wonderment, but that in this book he is little more than a weaver of gossamer words, and is not a master of English metre.

S. E. W.

ROUND THE COAST OF NORTHERN IRELAND. By Rev. CANON HUGH FORDE. *Belfast: R. Carswell & Son Ltd.* 1928. 9×6 *inches;* 215 *pages; illustrations.* 3*s* 6*d*

This little book is chiefly made up of bits of local history and folklore. When he describes landscapes the author is apt to indulge in enthusiastic superlatives. "Stupendous grandeur" and "sublime scenery" are scarcely the words to apply to the Antrim glens and coast road. Even the uncompromising whaleback of Knocklayd is said to rise in a graceful waving line. On the other hand, the Mourne Mountains with their remarkable granite tors receive very scant attention. In fact, the treatment of the three counties, Antrim, Derry, and Down, is most unequal. The strikingly contrasted chalk and basalt cliffs of Antrim naturally come in for the lion's share; but only half a dozen miles of the Derry coast are noticed, so that we never reach Lough Foyle and the flat Magilligan promontory famous for the Ordnance Survey base-line. It will be more useful as a historical than as a geographical guide-book. J. H. R.

PLAINES ET BASSINS DU RHÔNE MOYEN: Etude Géographique. By DANIEL FAUCHER. *Paris: Armand Colin* 1927. 10×6 *inches;* xii+670 *pages; illustrations and maps. Francs* 55

Under the above title M. Faucher presents us with the results of an exhaustive geographical study of the area lying between Lower Dauphiné and Provence. The theme running through the volume is the transitional nature of the Middle Rhône Valley, in relation to the great variety of its physical features. The characteristics which result from these interrelations are shown to be dominant, whether the area be considered from the purely physical standpoint, or from that of human movement and settlement. The climatic factor and the Rhône–Saône corridor are dominating influences in producing transitionality (if one may coin the expression). The variety results from the geological history of the region. M. Faucher makes it clear that we have not to deal merely with a definite point at which we pass, for instance, from the modified continental climate of the plain of Burgundy to the Mediterranean climate of Provence. "C'est entre les plaines du Comtat et le Bas-Dauphiné que se fait le passage d'un climat à l'autre, c'est à peu près tout ce qu'on peut dire." Not only is the climatic

change progressive rather than sudden, but it is irregularly so. Similarly, plant life, reacting to the climatic variation, although it changes completely from the northern to the Mediterranean type in the course of the passage from Tournon to Pierrelatte, changes spasmodically, according to the type of plant and to local conditions of soil and aspect. The author makes an elaborate and critical study of the working of these factors of irregular transition in all their geographical bearings, and is able, incidentally, to correct a number of common misconceptions.

Serious students of the geography of France will welcome the detailed account of the Rhône terraces which form such prominent features in the plains of Valence and Pierrelatte. Still more, perhaps, they will appreciate the analysis of the agricultural systems, past and present, which brings out the influence of the Rhône corridor as an element of disturbance and insecurity in the early days of settlement, but in later periods promotes the introduction and development of a highly varied agriculture fitted to the multiple aptitudes so characteristic of the region.

The book is illustrated by a number of good photographs. The maps, on the other hand, are miserable and serve but to irritate the reader. It is most regrettable that so valuable a contribution to regional geography should not have the advantage of clear and adequate illustrative maps. H. O.

GEOGRAFÍA DE ESPAÑA. By L. MARTÍN ECHEVERRÍA. 3 volumes (Coleccion Labor, No. 144–6). Barcelona: Editorial Labor 1928. 7×5 *inches;* 228, 182+xxxii, 200+xxxii *pages; illustrations, diagrams, and maps*

A host of delightful photographs and other illustrations lighten the reading of this rather laboriously prepared book, whose chief merit is to give the reader at least a nodding acquaintance with the small geographical units of Spain under their popular traditional names. But the author is uncritical, and he handles the physical facts as one unfamiliar with the physical sciences—or even with the scientists; witness three grating references under the heading "Climate" to "J. Hamm." Without being quite good enough to use as a work of reference, the book has its uses as a popular and portable compendium of facts, to be verified and followed up elsewhere with the help of the copious, but rather mechanical, bibliography. R. A.

THROUGH THE APENNINES AND THE LANDS OF THE ABRUZZI. Described and drawn by ESTELLA CANZIANI. *Cambridge: Heffer & Sons* 1928. 9×6 *inches;* xvi+340 *pages; illustrations and coloured plates.* 25*s*

The Abruzzi is still one of the wildest and least-known regions of Italy. The absence of large towns and the impossibility of finding even primitive hotel accommodation make it difficult to get to know it and its inhabitants. The motorist who visits these parts to-day may have better opportunities for seeing the villages and places of interest, or the wonderful gatherings at the great festivals, but he can never get into touch with the inhabitants like the visitor who settles down in the country, prepared to rough it and share to some extent their life. This Signorina Canziani did in the days before the war, when things were even more primitive than they are now, and she has set forth the results in this well-illustrated book. She paints better pictures with her brush than with her pen. Her descriptions do not bring either the country or the people as a whole very vividly before us. But she describes what she herself saw, and she lived in the villages long enough to get really on terms with the people, eating their simple food, sketching them, and above all collecting their poems in dialect and their stories and superstitions. It is these that give her book its value,

for the belief not only in the Evil Eye, but in witchcraft and magic must be almost as alive and widespread in these villages to-day as in mediaeval times; and Signorina Canziani has the knack of making these peasants talk. The collections she and her father made, many of the objects in which are reproduced in this book, must be interesting. The charms against the Evil Eye, for instance, are as varied as those described in Rolfe and Ingleby's 'Naples in 1888.'

L. C.-M.

A GLIMPSE OF GREECE. By EDWARD HUTTON. *London: The Medici Society* 1928. 9×6 *inches;* xii+324 *pages; illustrations and maps.* 18*s*

A new school of travellers, as of biographers, has come into being; and in some respects Mr. Edward Hutton's last volume bears its stamp—in so far as it is interspersed with dialogues between his companion, Mr. Norman Douglas, and himself; with strongly expressed opinions on questions only slightly connected with his subject; and occasional diatribes against the general stupidity of his contemporaries. But it is hardly necessary to say that he approaches the "intellectual beauty," as he calls it, of the Greek landscape with all the reverence of one steeped in the classics; choosing Homer for his guide-book, and hailing the dolphins in the Gulf of Corinth as almost sacred creatures. His vision is always that of a scholar looking deeper than modern disfigurements to the historic or mythical past of an enchanted land.

Beginning at Athens, and disregarding the city as it is to-day, the author describes the Acropolis, the Theatre of Dionysus, the Areopagus, and other haunted places, in a way which suggests a pilgrimage rather than a "glimpse." The spring weather lured them farther afield: to Hymettos, purple-crowned, and famed for its honey; to the exquisite ruins of Poseidon's temple at Sunion; to Pentelikon and Marathon; and to Aegina, with its ancient Doric temple on the bare height above the pine groves. More than once Mr. Hutton laments over the "dismal disafforestation" of many regions, which like other writers he ascribes to the depredations of the goats. Leaving Athens, the travellers took the Sacred Way to Eleusis—where only a trained imagination could reconstruct the scene of the Mysteries from the confused ruins. Though nothing remains of Thebes and Aulis but immortal names, and Delphi is "a rifled tomb," yet there and wherever the author wandered, it is the Greece of the tragedies and the Anthology that he brings before us.

This book, the work of a rarely sensitive mind in love with antiquity, is worthily produced, with many fine illustrations, and a pictorial map. There is also a large map of Southern Greece, which will be valuable to other travellers.

M. K.

EMBATTLED BORDERS: EASTERN EUROPE FROM THE BALKANS TO THE BALTIC. By E. ALEXANDER POWELL. *London: John Long Ltd.* 1928. 8×5 *inches;* xx+374 *pages; illustrations and sketch-maps.* 16*s net*

The author of this book states that his purpose was to "make clearer those extremely complicated political issues which are retarding the recovery and threatening the peace of Eastern Europe," of which, he maintains, most Americans have but a vague comprehension. To this prime aim he has added another by seeking "to combine entertainment with instruction" through the medium of personal experiences, amusing episodes, and so forth. His material was obtained by an extensive motor tour through Europe, undertaken at a date not precisely specified, but apparently quite recent; by personal interviews with many political and other personages of importance in the countries discussed; and by reading certain named articles in the thirteenth edition of the *Encyclo-*

pædia Britannica. A portable typewriter and a miniature set of encyclopaedias, he explains, formed part of the impedimenta with which his car, a "seventy-horsepower brougham," was loaded.

These frank statements as to the audience addressed and the author's methods and qualifications appear to render unnecessary any comment on the two latter from the point of view of a reader on this side of the Atlantic. There is nothing in the book to lead one to doubt the literal accuracy of the account of its genesis given and implied in the description summarized above. If to the hypercritical it may seem that neither the promised instruction nor entertainment reach a very high level, this is not to say that the average American reader to whom it is primarily addressed, and others, may not find both within its pages. There are a number of illustrations, some of which—with more of the "captions"—might have been omitted without loss, and several "maps" which certainly reduce the geography of the areas depicted to its simplest form. M. I. N.

TURKEY TO-DAY. By GRACE ELLISON. *London: Hutchinson & Co.* 9×6 *inches;* 282 *pages; frontispiece and* 21 *other illustrations.* 18*s*

This is a book for which many readers will be grateful. The personality of a Dictator is always interesting, and here we are introduced to a character, as imposing as Mussolini, in the person of Mustapha Kemal Pasha, known in Turkey as the Ghazi.

It was just after the Greek defeat that Miss Ellison met Mustapha for the first time. Even then he had made up his mind as to the future of Turkey. Harems, veils, hodjas, dancing dervishes, lattice-windows had to go: he was not going to interfere with worship of Allah, though for himself there was but one God whose name was History. The author had the good fortune to be present when the Ghazi put his ideas into action at his first official ball. When the ladies arrived they sat down together and most of them refused to take off their veils. The President walked over and took them off himself. When they had got over the shock they proceeded to enjoy themselves and danced as if they had been doing it all their lives. They never appeared again at social functions wearing veils.

The chapters on Angora are most interesting. The trains arrive and depart to a scheduled time and are met by motor buses. The houses are white and were "made in Germany." It is pleasant to renew the acquaintance of Admiral and Mrs. Bristol and to know that the British Embassy is the only one that possesses a view. We share the regret of the Turks at exchanging the voluptuous Constantinople for the more energetic and business-like Angora, but we fully understand the reason. The Turks could never work in Constantinople; now, at any rate, they can enjoy themselves there.

The second part of the book is given to the Women's Movements, the subject that is obviously closest to the author's heart. This part of the book is rather disappointing. Miss Ellison garnishes her deductions by introducing a number of characters who fail to arouse our interest. Still there are many items regarding Education and Diplomacy which are capital reading.

The book is a good one and will appeal to all who wish to understand the Near East as well as to all who like to study the characteristics of a man who can really be called Great. P. W.

TWELVE DAYS: An account of a journey across the Bakhtiari Mountains. By V. SACKVILLE-WEST. *London: Hogarth Press* 1928. 9×5 *inches;* 144 *pages; and illustrations.* 10*s* 6*d*

The writer of this little book gives an interesting account of her journey across the rugged Bakhtiari Mountains—from Isfahan to the Tigris. From lack of ex-

perience, she attempted to walk the long stages, along a track composed of stones of all sizes and shapes, but like other travellers before her she soon mounted a sure-footed mule. Perhaps the fatigue she experienced inspired her pen in the vivid description she gives of the movement of the tribes from the plains to the mountains. She noticed "the limping horse, the dying ram, the woman near to her delivery, the man with his foot bound up in bloody rags . . . no respite, no relief." The struggle for existence of the tribe has recently been illustrated by a cinematograph film, termed "Grass," the cause of this terrible migration over tracks where "lame or not lame, they must go forward"; and one only wishes that our authoress could have written the captions.

After suffering much discomfort, partly due to lack of preparation, the party crossed the mountains in safety. Coming to the valley of the Lower Karun, the authoress describes her arrival at the Maydan-i-Naftun, now, I understand, renamed Masjid-i-Sulaiman, where the Anglo-Persian Oil Company have created a really wonderful cantonment with a colossal equipment for extraction of the oil. Coming from romantic Persia, there was a distinct sense of anti-climax; but, even so, the pages dealing with this subject are well worth reading.

Of previous authorities, the excellent account of the Bakhtiari route given by Lady Durand in her 'Autumn Tour' (1902), was evidently missed, though it would have been particularly useful. What her readers will surely complain of is the absence of a map, for which no doubt the publishers must be held responsible.

P. M. S.

SHIKAR: Being tales told by a sportsman in India. By Lieut.-Colonel C. H. Stockley. *London: Constable & Co. Ltd.* 1928. 9×6 *inches;* viii+192 *pages; illustrations.* 12*s*

This book is a narrative of travel and sport written by a hunter of vast experience. The author begins with a journey to the shooting ground, and gives us a realistic picture of the difficulties, the dangers, the enjoyments of the march. Then we are taken to Kishtwar, a land of sheer precipices and glacier-scarred mountains that rise to 20,000 feet. Then south after sambhar and tahr to the Nilgiris, into country less imposing and magnificent, but probably no less picturesque. Then off to track tsine in the forests of North Burma, where dense jungles of bamboo and teak almost continuously clothe the hills. Then to Ladakh in pursuit of burhel right to the heart of that mountain knot which is probably the most massive system in the world. Then for markhor to the barren hills of Kalabagh. Then after bear in the valleys of Kashmir. Then to the desert scenery of Sind, where we follow ibex over fissured crag and through jungles of cactus-thorn. Lastly we cross the ocean to Somaliland, where we pursue the lesser kudu through prickly bush and thicket of tamarisk.

Thus the author's narrative is very varied. Moreover, his experiences are well told, full of incident and exciting adventure. He writes in an entertaining style which places his book above the level of those we are accustomed to read on Shikar. Colonel Stockley is also a good observer. His records of how the lammergeyer destroys its prey, how the wolf pulls down a succession of sheep, how the houbara squirts slime on its attacker, are observations both of interest and importance.

R. W. G. H.

SPORT AND WILD LIFE IN THE DECCAN. By Brigadier-General R. G. Burton. *London: Seeley, Service & Co.* 1928. 9×6 *inches;* 282 *pages; illustrations and map.* 21*s*

The author of this life-record is a soldier, a historian, and a sportsman. He has followed closely in the footsteps of his father, inheriting the same love of sport,

the same interest in jungle life, and the same desire to record for others his varied experiences in Indian jungles.

Some of the early chapters deal with the history of Hyderabad. But the volume is mainly one of jungle experiences. The author has been a great hunter and has had remarkable adventures throughout his long service in the Deccan. He describes the organization of hunting expeditions which sounds like the preparation for a military campaign. Then he tells us many things about tigers and leopards. For example, he is satisfied that their spots and stripes are genuine instances of protective colouring, and he brings out a point which we think important, namely, that their schemes of colour are particularly concealing at night. The author is clearly very interested in colour. He writes authoritatively on those strange aberrations, the white tiger and the black panther, and he quotes evidence which, though not convincing, is yet striking, of a black tiger having been seen at Chittagong.

The author enters on the debated subject of how the great carnivora find their prey. He is satisfied that the tiger and the leopard hunt by sight aided by hearing, and very little, if at all, by scent. Then he records many facts about man-eaters, and has every right to speak with authority, for twice he has seen men mauled by tigers, five times seized by leopards, and was himself charged and torn by a panther. On the subject of wolf-children he is very entertaining. But the evidence for their existence we think quite unsatisfactory. So long as the capture of a wolf-child is supported only by native testimony we cannot regard the extraordinary belief as anything but a pure myth.

Thus the book is varied, interesting, and instructive, and worthily carries on that love of the wilds which the author has inherited from his distinguished father. R. W. G. H.

FRIENDLY SIAM. By EBBE KORNERUP; translated from the Danish by M. GUITERMAN. *London: G. P. Putnam's Son Ltd.* 1928. 9×6 *inches;* xii+256 *pages; illustrations and map.* 10*s* 6*d*

Since the efficient Siamese Railways linked that country with Malaya on the one side and French Indo-China on the other, Bangkok, the capital, has become an accessible and attractive spot on one of the tourist highways of the Far East, and consequently a good deal has recently been written about Siam. The latest book on the subject is 'Friendly Siam,' by Ebbe Kornerup, an experienced Danish traveller who, arriving in Siam by the pedlar's track from Burma to Raheng, passed several months in the Interior, his journeys being greatly facilitated by Government assistance (a quite unusual favour) in the matter of transport.

The Table of Contents of this book might seem to indicate a volume following the stereotyped model for books of travel, but on reading within, the work proves to be quite otherwise. The author remarks that "Siam is the newest holiday land," and his book is a holiday book, a record of irresponsible roamings right off the globe-trotter's track, made for pure pleasure and set down with much literary skill. Geographically it adds little to the sum of things known, and in other scientific aspects it is equally unimportant. Beauty and sunshine, life and laughter, are its constant themes, and to these the writer subordinates all other matters.

Travelling by road, rail, river and air, walking the forest trails and resting in the towns, it is of the lovely scenery and the delightful people encountered that he will still be talking. Like the sundial, he registers only the sunny hours. All nature is exquisite, every man a good fellow and all the women beauties. Truly he finds Siam friendly, for his own cordiality evokes the best traits of this

amicable people. He joins their games, feasts at wakes, makes merit at the temples, and bathes with all and sundry, from princes to convicts.

His chapter on "The Railways of Siam" resolves itself into glimpses of flying field and forest, of gay young men and soft-eyed girls seen in the train; a feed in a Chinese eating-house, a ride with a sculptor dressed in pink silk, a carouse with a musical tinker; but of the Railways—nothing. Again, under "The Northern Frontier of Siam" there is an idyllic account of life in a houseboat on the Mekong with a French official, a prince, a painter, and a merry Lao crew. Happy days, bathing in brown waters and gliding past magnificent forests. Happy nights, ashore under the stars, watchfires burning, soft voices singing near by. And of the prickly Frontier Question—no word. As for the towns, they are all flowers, music and girls; boat races and football; badinage with the monks and festivities with officials.

But incidental to these tales of delight are innumerable casual-seeming allusions that convey much general information, wrong in minor detail here and there, but in the main correct. The author's style is convincing, the translation is well done, the illustrations are good, and the book as a whole gives a true impression and is calculated to interest and amuse the few who know Siam as well as the many who do not.

Of statistical appendices, glossary or index there are none; but this is scarcely surprising in a book intended mainly to amuse, and does not affect the peculiar charm of the work, which is considerable. The map is of small value. W.A.G.

EXPLORATIONS AT SODOM. By MELVIN GROVE KYLE, D.D. *London: The Religious Tract Society* [1928]. 7×5 *inches;* 142 *pages, and illustrations.* 5*s*

This book consists of a series of letters written during a short visit paid by the author and his party to the south end of the Dead Sea. They are amusing and readable, but the author's ideas cannot be taken quite as seriously as he supposes. No fresh evidence which can really throw light upon the story of the cities in the Plain has been found. It is a very old theory that the site was in the neighbourhood of Jebel Usdum. The solitary archaeological fact is the report of Dr. Albright that "the pottery from Bab-ed-Dea'r (a site 500 feet above the Dead Sea on the road from Mezrara to Kerak) is all older than the eighteenth century B.C.," and was thus possibly of the time of the catastrophe of Sodom and Gomorrah. But of actual remains of any of the cities none were found. It is difficult to see where the present explorations carry us beyond the observations of such men as Robinson, Blankenkorn, and Ellsworth Huntington, whose views are here characterized as "unscientific speculations." E. W. G. M.

TRAVELS IN FRENCH INDO-CHINA. By HARRY HERVEY. *London: Thornton Butterworth* 1928. 9×6 *inches;* 286 *pages; illustrations and sketch-map.* 10*s* 6*d*

Mr. Hervey is an assiduous American traveller-journalist whose flamboyant style must spoil the interest of his work for serious readers. For him even the air must lie "in a sensual swoon," and when he approached Wat Phu, the "hidden" city near Bassac, on the Mekong, which was the objective of his journey in French Indo-China, he tells us that he was conscious that he would "feel very emotional": a condition of mind which does not make for exactitude. The publisher's note on the "jacket" of the book refers to Mr. Hervey's "quest and discovery of Wat Phu . . . about which up to now practically nothing has been known," and although Mr. Hervey does not definitely claim to have discovered Wat Phu in the sense that Cristoval de Jacque discovered Angkor, this is the impression likely to be left on the uninformed reader's mind. The

suggestion throughout is that, beyond a vague story he had picked up from a beachcomber in Singapore, no information about Wat Phu was available either from man or book.

A few inquiries would have shown him, however, that Wat Phu (or Vat Phu) was described as far back as 1873 by F. Garnier in his "Voyage d'exploration en Indochine"; and that subsequent accounts have appeared in several archaeological works, the fullest description being that by Henri Parmentier in the *Bulletin de L'Ecole française d'Extreme-Orient*, 14, No. 2, 1914, fully illustrated with photographs and detailed plans. Of Mr. Cavor, the scientist in Mr. Wells's 'First Men in the Moon,' it was said that he did not discover the moon: he reached it. In the same way Mr. Hervey reached, but did not discover, Wat Phu; and had he thought fit to refer to some of the works mentioned, he would have added value to his own rather sketchy description of these magnificent remains, which are, as he rightly says, comparable with those of Angkor and, being less accessible, are much less known. O. R.

THE MALAY PENINSULA AND ARCHIPELAGO. By ASHLEY GIBSON. *London and Toronto: J. M. Dent & Sons* 1928. 7×4 *inches;* xiv+236 *pages; illustrations by Barbara Shaw and two maps.* 5*s*

Mr. Ashley Gibson, editor of the "Outward Bound" series of handbooks of which this volume is the fifth, is well qualified to write of the Malay Peninsula, since he was formerly editor of the *Malay Mail*. His account of British Malaya as it is to-day is an admirable example of how much exact information can be compressed into small space without dullness, though there is little doubt that Sir Francis Drake was never off Penang (as is suggested on p. 7), since the *Golden Hind*, so far from being "the first British keel to furrow the Malacca Straits," followed the south coast of Java and then struck off to the Cape. The description of Insulinde, or the Dutch East Indies, is less comprehensive and less informative, consisting of travel impressions in journal form. It seems a pity that Mr. Gibson does not see fit to include an index with the volumes of this series, and it is surprising that he should have passed a map which shows the whole Peninsula south of the Siamese border as Malacca. Miss Barbara Shaw's drawings in black and white add charm to the book.

A SAHARAN VENTURE: A journey across the Sahara from Kano to Algeria. By DONALD CAMERON. *London: Edward Arnold* 1928. 9×6 *inches;* x+314 *pages; illustrations and sketch-map.* 18*s*

Mr. Cameron's journey from Nigeria to the Mediterranean by way of Aïr and Janet was the subject of a paper read to the Royal Geographical Society in March 1928. He travelled with no ulterior motive than that of returning home from Nigeria, where he was serving in the W.A.F.F., by a road not hitherto followed by British travellers. Having obtained the necessary leave from his superiors and all the French authorities concerned, he was hospitably entertained by the latter, as he gracefully acknowledges. In Aïr he found great difficulty in procuring a guide for the route he elected to take via Janet. All combined to persuade him to follow the better-known road via Tamanghasset and the Ahaggar Mountains. Mr. Cameron, however, was not to be put off; so eventually a man who purported to know the way was procured by the French as a result of putting pressure on a well-known Tuareg chief in Northern Aïr. Had Mr. Cameron been more familiar with local conditions and known the Tuareg language, he might have found a better guide for himself or learnt enough to mistrust the one supplied. Six days from the last water in Northern Aïr the party found itself completely lost. Wandering about in search of some familiar

landmark or the well for which they were bound, Mr. Cameron and his party thus remained for sixteen days, being reduced finally to a cup of water each. One man, a Nigerian servant, died of exhaustion; several camels were lost owing to lack of pasture. Finally, as they were near the limit of their strength, the guide, reconnoitring the neighbourhood, chanced upon a Tuareg, the last in that area of several who had been grazing their camels in this outlying district but had since returned north to more favoured country. The two men brought water back from a neighbouring pool which the party reached two days later.

The story is well and modestly told of an adventure which it is given to few, and to none without Mr. Cameron's pluck, to survive. The book lays no claim to be anything but a simple description of his journey, the rest of which was accomplished without mishap. His picture of the hardships which are the lot of the French Saharan officers will be confirmed by all who have known them. The author has read all that has been written about Aïr and makes full acknowledgment of such information. His conclusion, however (p. 83), that in Barth's day no other village than Seliufet existed in that district in Northern Aïr is certainly incorrect: T'in Taghoda, which is quite close by, is mentioned by Barth, while the palm groves at Iferuan and some of the ruined houses there are certainly more than seventy-five years old. Mr. Cameron has perhaps not sufficiently appreciated the circumstances attending Barth's arrival in Aïr in 1850: the attacks to which he and his companions were being subjected precluded their visiting the area until they had made the friendship of Annur, then paramount chief of Aïr.

Mr. Cameron's book is well illustrated and is provided with an index and with the Royal Geographical Society map prepared for his paper. One could have wished for the inclusion of a sketch-map of his peregrinations while lost north of Aïr. It is regrettable that the publisher, having so pleasant and comely a work to sell, should have seen fit to bind up therewith a list of his "autumn announcements"; the practice is all the more gratuitous as the high price placed on the book will unfortunately keep many people from buying it. F. R. R.

THE FELLAHIN OF UPPER EGYPT. By WINIFRED S. BLACKMAN, with a Foreword by R. R. MARETT. *London: George Harrap Ltd.* 1927. 9×6 *inches; 332 pages; and illustrations.* 15*s*

To consider in detail Miss Blackman's observations of the habits and customs of the Modern Egyptians is the duty of a trained anthropologist rather than of a reviewer writing for a geographical public. What the author has attempted to do is best described in her own words. This modest volume, replete with observations and information, is only a part of Miss Blackman's six years' work among the Fellahin, spent, as Marett says in his foreword, by one who had the capacity of "melting like a disembodied spirit into the atmosphere of local life." She lived among the peasants, rightly regarding "their customs as of great importance in themselves" but even more important as her researches have already "thrown light on points hitherto obscure to students of Ancient Egypt." Although the book is written in non-technical language and is profusely illustrated, it is perhaps rather too detailed for the ordinary reader, who will in the first instance at least probably prefer to turn to Lane. If, however, thereafter he is still interested in pursuing the subject then must he inevitably study Miss Blackman's work, for there is no greater authority. F. R. R.

GORILLA. Tracking and capturing the Ape-Man of Africa. By BEN BURBIDGE. *London: George G. Harrap & Co. Ltd.* 9×6 *inches;* 285 *pages; illustrated from photographs.* 10s 6d

In this book the author gives a narrative of sporting adventures in Central Africa. He writes with the pen of authority gained from experience on four expeditions. He begins with quite a graphic account of what a safari is actually like. Then he passes to experiences with wild game. He is encountering buffaloes, tracking herds of elephants, facing charging rhinoceroses and lions. The narrative of these exciting adventures provides its full share of thrill.

But the most important part of the book relates to the author's experiences with gorillas. His object was not to kill the gorilla, though the event managed to take place. His purpose was to obtain moving pictures of the animal in its natural forest habitat, also to capture the young gorillas for transportation to zoological gardens. Such a project was certainly not without a spice of danger. It led the author to that remote but comparatively small forest guarded by the heights of Mikeno, Karisimbi, and Visoke, where a rare and interesting form of the gorilla still holds its own. Any one who has attempted animal photography will realize what is meant by walking up gorillas and facing them with a moving-picture apparatus. We can well imagine the tremendous difficulty, the genuine hardship, the repeated failure. Nevertheless the author seems to have succeeded, and not only in securing pictures, but in actually throwing himself on the young gorillas and snatching them from the infuriated herds.

It is all very exciting and adventurous; but is it really justifiable? The gorilla, next to man, is, in a sense, the most interesting animal in the world. He may justly be regarded as our nearest relative. His numbers are very few, his habitat is restricted, and nothing would be easier than to blot him out. Shooting him is quite beyond justification. But here we are concerned with capturing the young. Is that worth while? We doubt it. Young gorillas do not bear confinement: their attitude is one of unrelenting savagery, and they die of tuberculosis or the miseries of solitude. We think that their capture should not be encouraged. Even science may at present be best served by leaving them unmolested in their jungles. R. W. G. H.

NOTES ON SOME BIRDS OF DAR ES SALAAM. By CECILY J. RUGGLES-BRISE. *Norwich: Jarrold & Sons Ltd.* 7½×5 *inches;* xvii+96 *pages;* 29 *illustrations.* 4s 6d

This is an unpretentious little book. The authoress is a lover of birds, and has put together her ornithological notes made in the Dar es Salaam province. Her record is likely to help those who happen to live in this particular area. There is a brief description under many of the species which may be enough to identify them in the field. The authoress is very modest about her work and does not claim scientific value for it. But it is these simple unpretentious bird-books which are of the greatest service in the tropics. Many a new-comer would take an interest in birds were he able to get an encouraging start. The technical volumes often frighten him: it is just a simple book of this kind that is likely to arouse a sleeping interest and direct a beginner to serious ornithology.

R. W. G. H.

SLAVES OF THE SUN. By FERDINAND OSSENDOWSKI. Translated from the Polish by H. C. STEVENS. *London: George Allen & Unwin Ltd.* 1928. 9×6 *inches;* 378 *pages; illustrations and sketch-maps.* 16s

Professor Ossendowski's latest volume describes an extensive tour he recently made through France's West African possessions. From Konakry he travelled

slowly northwards through French Guinea to Bamako on the Niger. From there he turned eastwards, spending some time in Wagadugu and its neighbourhood, and eventually regained the coast at Grand Bassam. Throughout he was the guest of French colonial officials, who generously afforded him every opportunity for seeing their work amongst the curious medley of tribes who inhabit this vast region. The English translation is welcome, for little has yet been published in our language regarding this very interesting part of Africa.

Those who are acquainted with the author's methods will realize that the sinister rites of the more backward forest tribes provided a mass of material well suited to his exuberant style. Many of the pictures he paints are somewhat highly coloured. He tells us that the only field left for him "to investigate is that of the souls of various coloured peoples." His investigations were necessarily of a superficial nature, but this in no way prevented his arriving at definite conclusions. They are consequently of a very speculative nature. This is equally true of his hazardous excursions into history and ethnology.

While showing keen appreciation for the work of French officials, he was profoundly impressed by the evils arising from an over-close association of the two races. Although many have noticed the extraordinary prevalence of concubinage in French colonial life few have ventured to write as frankly as Professor Ossendowski on this difficult subject. It certainly enhances the value of his book.

The illustrations are good, but the maps, although five in number, are regrettably inadequate. E. W. B.

CHARLES H. ROBINSON: a Record of Travel and Work. By FLORENCE ROBINSON. *London: Society for the Propagation of the Gospel* 1928. 9×6 *inches;* xii+144 *pages; illustrations and sketch-maps.* 3*s* 6*d*

Miss Florence Robinson has written a pleasing memoir of her brother, who devoted the whole of an active life to missionary work. Besides serving for twenty-three years as editorial secretary of the S.P.G. he travelled widely and published numerous books, mostly bearing directly on the mission field.

The most interesting part of this memoir is the account of Canon Robinson's early missionary journeys in Armenia and Hausaland, for which the author has drawn largely upon her brother's diaries and letters. To many he was best known as a Hausa scholar. It is surprising to learn that the author of the 'Hausa Grammar' and 'Dictionary of the Hausa Language,' which were published over twenty years ago and are still standard works in general use, spent but one adventurous year in the Hausa country. E. W. B.

EAST AFRICA BY MOTOR LORRY. By W. W. CAMPBELL. *London: John Murray* 1928. 9×6 *inches;* xii+318 *pages; illustrations and sketch-map.* 18*s*

Mr. Campbell's book is an account of his experiences of the East African Campaign as a Ford lorry driver. His good-humoured reminiscences contribute nothing to geography or to military history, for he had little occasion to hear what was going on and did not become involved in any active hostilities. He gives a good if protracted account of the life and hardships which were the lot of the white and black men, combatant and non-combatant alike. But his point of view is always that of the civilian doing a civilian's work with more than a few traces of impatience at all military things. F. R. R.

A HISTORY OF CANADA. By CARL WITTKE, PH.D. (The Borzoi Historical Series.) *New York: Alfred A. Knopf* 1928. 9×6 *inches;* xiv+398+xviii *pages.* $4

Of recent years Americans have been taking more and more interest in the history of Canada as witnessed by the increasing number of chairs of Canadian

history established in American universities. Under the general editorship of Professor Harry Barnes, Professor Carl Wittke of the Ohio State University has written a history of Canada from its discovery to the present day.

The greater portion of the book is devoted to the modern period from 1860 to the year 1927. For the early period the main facts only have been given. Here "Mont Real" for "Mont Royal" is a bad slip. The mountain named by Cartier Mont Royal was probably called Montreal after the son of the Sieur de Pontbriand, Seigneur de Montreal. Professor Wittke tells the story of the conquest and that of the Loyalists in an impartial manner, and throughout his book one must admire the success of his endeavour to be fair to those who took the anti-American side. In his account of the Maine boundary dispute he has unfortunately overlooked Colonel Dudley Mills' remarkable article which appeared in the *United Empire Review* for October 1911. Nowhere can one find a better statement of this dispute, which is also illuminated by very clear and useful maps specially made for Colonel Mills. On the whole, however, the bibliographies given at the end of each chapter are very good and up to date, and should prove very useful to students seeking further details of any period.

The description of the modern period is well done and must be considered rather a *tour de force*. That the author has been able to cover the whole period of Canadian history and present such a readable survey of the modern period should certainly redound to his credit. It is hardly true, however, to say that 100 per cent. Canadians distrust the "hyphenated" class. The account of Canada's participation in the Great War is sketchy but not unsatisfactory.

There are a few misprints, as Longheed (p. 317) for Lougheed; Cassals (p. 224) for Cassels. There is a good index, and the appendix contains the British North American Act of 1867. H. P. B.

FOREST AND STREAM-FLOW EXPERIMENT AT WAGON WHEEL GAP, COLORADO. Final report, on completion of the second phase of the experiment. By C. G. Bates and A. J. Henry. (U.S. Dept. Agric., Monthly Weather Review, Suppl. No. 30.) *Washington, D.C.* 1928. 12×9 *inches;* iv+80 *pages; illustrations and diagrams*

The influence of forests on climate and run-off has been a frequent subject of discussion for nearly a century, but it has long been realized that only a scientifically controlled experiment on a large scale could yield incontrovertible results. This experiment has now been carried out by cooperation between the Forest Service of the United States and the U.S. Weather Bureau. Two adjacent valleys were chosen, tributary to the Rio Grande in Colorado, as nearly as possible alike in size, configuration, aspect, geological structure, and climate. The valleys were small, covering just over 200 acres each; their average rainfall was about 20 inches a year, and they were occupied by small perennial streams of about the same volume. At the beginning of the experiment in 1909 both valleys were almost covered by a moderately thick forest mainly of spruce and aspen. A number of meteorological stations were established in suitable exposures, and flow-gauges with settlement chambers for silt were constructed near the lowest points of the streams. The rain-gauges were correctly exposed in clearings, the distance of the nearest trees being not less than their height, but the rims of the gauges were about 4 feet above the ground—an important point. Observations began in 1911 and continued for eight years, demonstrating that the climatological conditions in the two valleys were in fact almost identical. In 1919 one of the valleys (B) was denuded of forest, the other (A) being left untouched, and observations were continued for another seven years. Fortune favoured the experiment, the second period being very similar to the first in its

general weather. Change :which occurred in valley B after deforestation, but which were not shared by the untouched valley A, could therefore be attributed with certainty to the actual removal of the forest cover.

The changes in the climate itself were small, but quite definite except in rainfall. During the first period, when both valleys were forested, the mean temperature of B was 0·2° F. lower than that of A, but after B was deforested, its mean temperature was 1·1° F. higher than that of A; the effect of deforestation was thus to increase the mean temperature by 1·3° F. The effect was greatest during the day, but the nights also were slightly warmer after deforestation. Wind velocity in valley B relative to that in A became more than three times as great. Precipitation showed an apparent decrease of 2 per cent., but the authors believe that this decrease was due to the more open exposure of the rain-gauge owing to the removal of the trees and the increase of wind velocity, an effect which would be accentuated by the height of the gauges above the ground. It is possible that there was in addition a real decrease of rainfall, but if so, it must have been extremely small. A far more important effect was the earlier melting of the snow in spring as a result of deforestation, the average date of melting being advanced by four days.

The total volume of water in the stream occupying valley B increased, as a result of deforestation, by an amount equivalent to 1 inch of rain a year. This requires a decrease of the same amount in the losses of water by evaporation and transpiration. How this decrease was brought about is not definitely shown by the observations, but the authors attribute it to decreased transpiration by the light cover compared with the forest. The increased evaporation from the ground after deforestation was balanced by the snow formerly intercepted by the trees. Of more importance than the slight increase in total flow, however, was the concentration of this increase in the spring floods, resulting from the more rapid melting of the snow. After deforestation these floods increased in height by more than 50 per cent. Still more striking was the increase in the amount of silt carried by the stream, which as a result of the withdrawal of the protection of the forest, combined with the increased height of the spring floods, was more than eight times greater after deforestation than before.

These figures are conservative, for in this experiment the subsoil was porous, and much of the precipitation fell as snow, both factors prolonging the interval between the occurrence of precipitation and its appearance in the streams. Had the conditions been such as to cause extensive and rapid surface flow, especially had the subsoil been clay, there can be no doubt that deforestation would have resulted in a far more rapid removal of the finer soil particles. This is the lesson of the experiment: deforestation has little effect on climate, it considerably increases the rapidity of run-off, and it greatly magnifies the rate of erosion of the soil.

C. E. P. B.

BRITISH HEADQUARTERS MAPS AND SKETCHES used by Sir HENRY CLINTON during the War of Independence, 1775–82. A descriptive list by RANDOLPH G. ADAMS. *Ann Arbor: William L. Clements' Library* 1928. 9×6 *inches;* vi+144 *pages, and a plate.* $1.50

A unique collection of special maps was recently acquired by the W. L. Clements Library of Ann Arbor. It had been made by Sir Henry Clinton, for three years Commander-in-Chief in North America during the War of Independence, and has come down apparently intact. Though naturally chiefly military in character, there are amongst these printed and manuscript maps some of general value and others which will probably prove of considerable value to local historians. There is, for example, a manuscript map which Mr. Adams

thinks is the basis of Sauthier's printed map of New York, dated 1779, of which there is also a copy in the collection, and another bearing the same relation to Bernard Romans' map of East Florida. Several show the distribution of land-holdings in considerable detail, with the names of the owners. The military sketches, which cover fortifications, dispositions of troops, battlefields, etc., are largely the work of Engineer officers, particularly of Abraham D'Aubant, the commander, and Captain John Montresor. They are concerned with four main areas—the fortifications of Nova Scotia, Long Island and New York, in the taking of which Sir Henry Clinton displayed abilities which later secured him the chief command, the capture of Charleston, and the investure and surrender at Yorktown. Many bear comments in Clinton's handwriting: it is possible he used them later in the preparation of his defence after his conduct had been criticized. Mr. Adams' hand-list of these maps gives all the particulars as to size, scale, date, and subject-matter at present ascertained, arranged topographically, with references for the printed maps to P. L. Phillips' 'List of American maps in the Library of Congress.' The value of these maps, as he points out, must be demonstrated by historical students. G. R. C.

UNDER TURQUOISE SKIES. By W. H. ROBINSON. *New York: The Macmillan Company* 1928. 9×6 *inches;* xvi+538 *pages; and illustrations.* 21*s*

This book, which describes the extensive arid and semi-arid south-western region of the United States, has been written so as to appeal more particularly to American readers, at all events so far as the style and much of the detail in the subject-matter is concerned. It is pleasingly got up, is provided with a number of striking photographic illustrations, and treats of the people and places of interest in a sympathetic and lively vein.

The author knows the South-West well. He must have spent a considerable amount of time there getting into close touch with the native population and studying the flora, the fauna, and the extraordinary scenic phenomena of the region. Upwards of one-half of the book is devoted to an exhaustive account of the Indians past and present, who here find a champion who would preserve them, bringing gradually within their reach such parts of modern American civilization as may serve that purpose. The arts and crafts, the customs, and the economic life of these people are very fully treated. The period of Spanish rule with the lingering Spanish tradition likewise warms Mr. Robinson to an enthusiasm for its picturesqueness, and the wonderful natural scenery affords him ample opportunities for graphic description. In spite of its merits, however, the book is too long for the matter given. Everything could have been said in fewer words and said better, if only the padding of popular jargon were less obtrusive. E. W. S.

COMMERCE OF SOUTH AMERICA. By C. F. JONES. *Boston: Ginn & Co.* 1928. 8×5 *inches;* xvi+584 *pages, and illustrations.* 15*s*

The South American market is of great interest to the people of the United States for various reasons, chiefly perhaps because geographical situation is taken by them as providing something in the way of natural privileges which they are proceeding to exploit with all their energies. The result of their efforts so far, as set forth at various points in this book and particularly in the final chapter, are distinctly encouraging. The opening of the Panama Canal, the upheaval in Europe during the Great War, abundance of capital for investment, and a highly efficient trade information service, have all helped towards the rapid advance of the United States in the markets of the southern continent.

Professor C. F. Jones's book is a fairly exhaustive one. Each of the eleven

chief political divisions of South America is fully treated as to its industries and as to the nature of its import and export trade. Much geographical material is supplied by way of explanation of the leading economic developments, and the external trade comes in for a full share of statistical illustration and practical comment. The book is, in fact, a business man's economic geography of the continent, full of information, sound and scientific as far as it goes, but designed on exceedingly commercial and somewhat simple lines. It has the merits of being quite up to date, balanced in treatment and well set out and indexed; but, like other semi-encyclopaedic works, it is apt to become monotonous through its constant emphasis of the descriptive point of view, and through the stereotyped sameness of treatment for each political division. The illustrations are of unequal value; some of the photographs help the text, others are disappointing or hackneyed; and it is doubtful whether many of the graphs will be of assistance to those who cannot grasp the printed figures.

This work is well worth attention from those who have commercial dealings with South America. It gives a very clear idea of the main factors that determine the trade of every part of the continent, and in particular, it furnishes well-informed and shrewdly written accounts of the relative standing of the great export manufacturing nations in the import trade of South American countries. Incidentally the British nation, with its "hungry millions" so often mentioned in the text, will find little comfort in the author's suggestion that it is being ousted by other nations from the import trade of South America, where the "competitive ability of the United Kingdom may have reached its peak and appears to be on the decline." E. W. S.

MY NATIVE LAND [CHILE]. By AGUSTIN EDWARDS, G.B.E., LL.D. *London: Ernest Benn Ltd.* 1928. 10×7 *inches;* xviii+430 *pages; illustrations.* 28*s*

The subtitle of this handsome volume by a well-known Chilean writer, for some years Chilean minister in this country, is "Panorama, Reminiscences, Writers and Folklore."

Special chapters are devoted to The Deserts, Copiapo, Coquimbo, Aconcagua, Valparaiso, Santiago, The Central Valley, Concepcion, Araucania, the Lake Region, Chiloe, and Magellanes. The scenery is described, generally at some length, and in every chapter there are notices and sometimes descriptions of any important happenings, such as battles, piratical inroads, or the foundation of mines and officînas. The accounts of the growth of such cities as Santiago, as well as of their streets, squares, churches, architecture, etc., should be of real interest to English readers who have hitherto had to depend mainly on Spanish books for such information. Some will be disappointed, however, with the omission to deal with many important questions and controversies.

Two chapters deal with the islands Easter and Juan Fernandez. These give an excellent and clear history of their discovery and settlement. Señor Edwards acknowledges his indebtedness to Mrs. Routledge for his account of "mystery island," and does not, so far as we can discover, add any new facts or suggestions.

In the sixth part of the volume which is entitled "Realm of Thought" there are numerous short biographies of Chilean historians, novelists, sociologists, journalists, and poets. This portion of the book will probably be quite new to English readers. There are not only excerpts from the works of these authors but also English translations. Another part deals with Beliefs, Superstitions, Myths and Fables of the Araucanians, but one reads it with a certain scepticism. There have been missionaries in Chile for centuries, and their efforts have been obviously misunderstood, transformed, and embroidered upon by a people who are not without romantic imaginations. Thus "There is another mythical

animal, the 'chonchon,' which takes the form of a human head with such well-developed ears that they serve it as wings for flying," or "If a girl fails to find a lover, she invokes the aid of St. Anthony and stands his image on its head until the longed-for gallant appears."

Such incidental allusions to geology, botany, and zoology as do occur must be taken with some reserve. It is difficult to agree with Señor Edwards, against general belief, that the Chilean conifers *Saxegothea* and *Fitzroya* have not been nearly exterminated. The well-known Antarctic Beech is described sometimes as Oak, sometimes as *Fagus*, and also by its proper name *Nothofagus*. There are also several misprints in botanical names.

So many readers prefer to have a miscellaneous mixture of scenery, history, and science in the descriptions of foreign countries that Señor Edwards has perhaps been well advised in adopting this particular system. He is an enthusiast, an ardent patriot rather than a scientific geographer, and his prose is frequently arresting and vivid. The book has clearly been written in Spanish, and though the translation is good, it is frankly impossible to translate the resonant magnificence of Castilian without a certain loss in effectiveness.

The illustrations are not from photographs, which is perhaps an advantage, yet one would not suppose from many of them that Chile is perhaps the loveliest country in the world. There is a useful list of books chiefly by Chilian and Spanish authors, and also an index. The map shows the railway lines, names of places and provinces, but is in no way remarkable. G. F. S.-E.

THE LAND OF THE FROZEN TIDE. By LOUISE ROURKE. *London: Hutchinson & Co.* [1928]. 9×6 *inches; 352 pages; and illustrations.* 21*s*

We might describe this book as a collection of chatty reminiscences: it has the charm and interest of an easy conversational manner, but without the irritating predominance of the personal. It is the chronology of a young Englishwoman's experiences in the far north-west of Canada—beyond the pale of civilization. The young author writes in a balanced and original manner, and despite its title, the book ranks far ahead of the trite melodramatic stuff which so often finds sale in this country by reason of a claim to expose the awful secrets of the frozen north.

The cinema industry at least would suffer if the present author's view were to achieve popularity. "The talk and the idea of the 'Great Open Spaces' is very fine and inspiring, but life in the Far North spaces can be very much the same as life in Balham or Golders Green: human nature does not alter with a change of scenery." A somewhat different note is struck in the following passage: "It is almost impossible to describe the silence that seems to descend upon the North when the last boat is gone, and one realizes that communication with the 'Outside World' is for the time being completely severed. It is something like the ominous silence that precedes a great storm: it seems to hold an angry threat, filling man with a terrible sense of his impotence and a feeling of great awe. ... And how shall I describe the silence, broken only by the cry of a coyote across the lake or the eerie music from the 'huskie chows'? Whilst living in that land it sometimes struck me that it was like living in a giant padded cell surrounded on every hand by vast pillows of snow, so arranged as to stifle all sound."

But it was by no means all a life of loneliness. There was the novelty of establishing a home, the thrills of exploration, the study of a new land, its Indian inhabitants and their strange customs, folk-lore and religion. Mrs. Rourke's judgment of white man's influence on Indian life is careful and not unfamiliar. "In many respects, I think it is a very regrettable fact that the religious outlook of the North American Indian has almost entirely given place to our Western theology. After all, what really have we given them but one set

of ideas in exchange for another, and are those ideas so very different when we come to balance theirs against our own ?"

The exhilaration that comes with the spring "break-up" and the arrival of the first steamer, boating races, treaty celebrations, trapping, and dog teams are all subjects of local colour to which the author devotes the final two chapters. The appendix takes the form of a very interesting diary, kept by the author's husband at Fort Chipewyan. The book is excellently produced and copiously illustrated. G. S. G.

UNDISCOVERED AUSTRALIA. By Capt. Sir G. H. WILKINS, M.C. *London: Ernest Benn* 1928. 9×6 *inches;* viii+292 *pages; illustrations and a map.* 21*s*

The combination of scientist and explorer is a fortunate one in a writer of a travel book, and when the scientist is able to rouse our interest in his searches, and the explorer has the gift of winning the confidence and respect of the people he comes across, the record of his experiences forms highly instructive and at the same time entertaining reading. To these qualifications Sir Hubert Wilkins added the special one for the task of leading the scientific expedition in North-Eastern Australia of being an Australian by birth, possessed of all the daring and endurance that characterize his countrymen.

In journeys extending over a period of two years and a half, the expedition traversed large areas of the "back country" in the region of the Dividing Range and to the west of it in Queensland, as well as certain parts of the Northern Territory and of the districts adjoining the Gulf of Carpentaria. In the course of these, there were time and opportunity to observe features concerning the vegetation, the animal and bird life, the geological structure, and the character and customs of the aborigines more systematically than has ever been possible throughout this wide area before. For it appears that the Australians in general are not greatly interested in natural science except in so far as it serves some immediately productive purpose. The picture which the book gives of that part of Australia which was studied is rather depressing. The native animals and birds seem to be dying out; even the tropical north-east of the continent, where the rainfall might be supposed ample, is said to be suffering from droughts and desiccation; the soil is frequently rocky and infertile; and the aboriginal people seem to be making no headway.

The merits of this work are the direct simplicity of its style and its obvious truthfulness, the keen observation of nature in all its aspects which it discloses, and the eminently sane outlook maintained throughout towards life and people. Apart from its scientific value it is a distinct contribution to the literature of geography and travel. E. W. S.

BENEATH TROPIC SEAS: A record of diving among the coral reefs of Haiti. By WILLIAM BEEBE. *New York, London: Putnam's Sons* 1928. 9×6 *inches;* xiii+234 *pages; and illustrations.* 15*s*

William Beebe has added another volume to his long list of nature studies—a record of diving operations among the coral reefs of Haiti. It is an interesting and instructive narrative, since it tells of an effort to open up a new field of biological investigation. For the author is not satisfied with tow-net and dredge, the ordinary equipment of the submarine explorer. He gets himself into a diving apparatus, descends beneath the ocean, and views at close quarters the strange life of a tropical sea. What a field is here opened up! Yet this is merely a pioneer effort, just a faint glimpse of that under-sea world still all but completely hidden from view.

The explorer stands in a submarine forest, a forest built of stony branches, which for brilliancy, variety, luxuriance, harmony, for its exquisite combination and blending of colour, for the weird and diversified nature of its inhabitants, makes it one of the wonders of Earth. In this book we have a popular account of the forest. It is written in the author's characteristic style, and puts before the reader a crowd of facts about corals, sponges, fishes, sea-anemones, and other types of submarine life. Nor is it a record of observation only. For the author takes down with him a motion-picture apparatus specially designed for under-sea work.

Also we are taken inland and shown something of shore inhabitants of Haiti. We are told of the swift evolutions of humming-birds, of the gorgeous displays of phosphorescent animals, of the courtship antics of fiddler-crabs. Thus the book will provide the lover of nature with several enjoyable hours. R. W. G. H.

BUILDERS AND PIONEERS OF AUSTRALIA. By ARTHUR JOSE. *London: J. M. Dent & Sons* 1928. 8×5½ *inches;* xii+220 *pages; maps.* 7*s* 6*d*

Mr. Jose gives thirty-page lives of Lachlan Macquarie, W. C. Wentworth, Sir Henry Parkes, and Alfred Deakin. These are his Builders. The Pioneers, more briefly treated, are Carstenszoon, Gregory Blaxland, and Hovell, explorers; John Blaxland, farmer; Simeon Lord, merchant and manufacturer; Greenway, architect; George Howe, journalist; and James King, inventor. The omission of notable names is inevitable in any selection for a short book, and it here admits of the inclusion of some men not well known to fame, about all of whom the author has an interesting story to tell. Wentworth is a carefully drawn character, his weaknesses not spared, but his title to rank as a builder of the Australian constitution established. The short paper on Gregory Blaxland, with its accompanying map, explains a matter that may have puzzled other non-Australians besides the present reviewer, namely, why it was that the comparatively low Blue Mountains formed a complete barrier to inland expansion for five-and-twenty years. After reading through the book one turns back to its first chapter, on Colonel Macquarie, undoubtedly the finest character portrayed. It is good to have this testimony that not every official sent out to administer the early colonies was a fool or a rogue. J. A. W.

OCEANS AND RIVERS. By E. G. R. TAYLOR. (Benn's Sixpenny Library, No. 31.) *London: Ernest Benn Ltd.* 1928. 6×4 *inches;* 80 *pages.* 6*d*

This pamphlet, within a size limit of some 25,000 words, deals with two subjects of much complexity, and, especially so far as oceanography is concerned, of wide range. The scheme of the series to which it belongs apparently excludes figures, index, text-headings and even an analytical table of contents, so that the task set before the author becomes Herculean indeed. Nor is it lightened by the fact that, presumably of set purpose, the treatment is not elementary and introductory, but assumes a considerable amount of previous knowledge on the part of the reader, both of physical geography in general and of the collateral sciences, especially chemistry. Again, the small amount of space available for the discussion of the results of modern research is still further reduced by the inclusion of a chapter—of much interest in itself—on Oceans and Rivers in Antiquity, and by a number of tables, often of a very detailed nature. The author has shown great courage, as well as much industry and skill, in facing all the difficulties, and the booklet contains a great mass of material. But it is not easy reading, and the attempt made in not a few cases to put into words facts and deductions which can only be made clear by diagrams and figures introduces needless complexities. It is, we think, more likely to be of value to students who wish to revise know-

ledge already acquired than to the general reader desirous of appreciating the modern outlook on hydrographical problems. The bibliography does not seem to have had so much care given to it as some other parts of the text. M. I. N.

SIR MARTIN FROBISHER. By WILLIAM MCFEE. (The Golden Hind Series.) *London: John Lane* 1928. 9×6 *inches;* xiv+288 *pages; maps and illustrations.* 12*s* 6*d*

This book cannot be taken seriously as an accurate life of Frobisher. Its author has not adequately investigated the available material, and his story, especially of the first part of the career, is seriously incomplete. Fifty years ago the Rev. Frank Jones published a biography of Frobisher in which he recorded the bare fact that his hero went with John Lok in the Guinea expedition of 1554, and confessed inability to account for him in the succeeding ten years. Mr. McFee makes the same statements. He evidently has not seen the contributions to the *English Historical Review* by the late R. G. Marsden and Miss K. M. Eliot (in 1906 and 1917 respectively). In these papers the early career of Frobisher is revealed in some detail. The fact that he accompanied the tragic expedition of Thomas Wyndham in 1553 is established, and his further adventures in Guinea are traced, together with his voyage to Morocco and his subsequent piracies in European waters. These things are not touched upon in the present volume. The records of the Admiralty Court contain much information on Frobisher as a pirate, but they have not been consulted. In connection with the voyages in search of the North-West Passage there are two manuscript books listed in the Exchequer Miscellanea which also need investigation. Mr. McFee, in fact, has relied too much on his predecessor Jones without realizing that the research of 1878 will not pass muster in 1928.

Having noted these omissions, it is more pleasant to turn to the book's contents. It will probably be liked by uncritical readers, for its style is lively, and its brightness never flags. It cannot be recommended for school libraries, since its spelling is transatlantic. If Mr. McFee is an American he quite properly uses such forms as defense, pretense, and marvelously, but it is surely the duty of the general editor of an English series to correct them in a book issued by a London publisher; and there are renderings of proper names (Rio Hasha, Terciara, Corunnia, Sutphen) which are not good in either language. The best chapters are those which tell the story of the Arctic voyages. Here Mr. McFee has caught the spirit of the original narratives and gives a vivid picture of the perils and heroism of Frobisher and his men. He gives a good account of his Yorkshireman's hard hitting at the Armada, of his characteristic quarrel with Drake over the plunder, and of his notable services in the following years.

The author has avoided the biographer's temptation to make his hero carry the whole age upon his shoulders. He realizes that the Elizabethan achievement was not the work of any one man, and he has made Frobisher a credible character by not overdrawing him. His Drake is shrewdly revealed as a man and not an impossible paragon. His Hawkins is given credit for sterling public service, although dubbed on occasion a slippery old gentleman and a buccaneer. Elizabeth also is every inch a queen, if perhaps a thought too stingy. Mr. McFee is at his best in dealing with personalities, and his book is good to read if not on all points to believe.

The illustrations comprise contemporary maps, well reproduced, some good modern drawings of ships, and one of a gun which seems to have slipped in by mistake under an obviously incorrect label. J. A. W.

THE ART OF THE CAVE DWELLER. By G. BALDWIN BROWN. *London: John Murray* 1928. 9×6 *inches;* xx+280 *pages; illustrations.* 18*s*

This book contains an illustrated account, and criticism, of Palaeolithic Art which is now so well known from the many illustrations of it published during the last dozen years. Ever since cave mural drawings were discovered the question has been asked, Why were they made? What was the compelling motive which drove these primitive hunters to depict on the cave walls the animals shown upon them? Was it a case of Art for Art's sake, or was there some magical motive, some utilitarian end? There is much difference of opinion on the question, though latterly the magical theory has practically held the field. The author, like a good many other people, is apparently not fully satisfied with this view, and he quotes that very acute and well-informed critic, M. G. H. Luquet, who has pointed out that there must have been art as art before there could be Art as magic. In fact, there has been a good deal of confusion in the minds of the magic enthusiasts, for obviously there must have been previously an artistic impulse to make the drawings before magic could come in as a secondary motive. It has moreover been urged that the careful finished work of many of the drawings was unnecessary if they were made simply for magical purposes. Prof. Brown ingeniously counters this objection by suggesting that the artist might be urged to greater precision in his work, and to make his picture resemble as clearly as possible the original by the belief that in so doing he would increase its magical power. He submits palaeolithic artistic work, both mural and mobiliary, to analysis, and considers it from the standpoints of composition, form, imitation, perspective, utility, etc., without, however, forming very definite judgments. Such are perhaps not to be expected, for what has been called the Art of the single thing is the predominating feature of Palaeolithic Art, and only the very beginnings of anything like composition or perspective are discernible. His general conclusion would appear to be that the work had its inspiration and primary motive in an artistic impulse, seconded and aided by a belief in its magical efficiency. He ends by quoting the diametrically opposed judgments of two well-known experts on Prehistoric Art. According to M. Hoemes ('Urgeschichte der bildenden Kunst') this art "is, relatively speaking, beggarly poor: . . . with the highest grade of formal perfection it reaches at the same time the lowest pitch of hopeless sterility." M. Kühn, on the other hand, ('Die Kunst der Primitiven') regards the mural paintings of Altamira and Font de Gaume as masterpices of art. They are "not based on a mere slavish imitation of nature, but on a recognition by a stroke of genius of what is essential in the impression made on the sight."

In a word, for Kühn we have here the triumph of impressionism, a view with which apparently the author has some sympathy, for he remarks that "the parietal artist had mastered the forms of nature until they had become part of himself, and was employing them in easy freedom." In face of such contradictory views the unfortunate ordinary person who is interested in art, but not an expert, may well feel somewhat bewildered. The only solution for him is to visit the sites and thus form a first-hand judgment, or, at second best, to study the skilful copies made by the Abbé Breuil, that adorn the sumptuous monographs on the caves of Altamira and Font de Gaume published through the munificence of the Prince of Monaco. E. A. P.

THE CAMBRIDGE ANCIENT HISTORY. Volume of Plates II. Prepared by C. T. SELTMAN. *Cambridge: University Press* 1928. 9×6 *inches;* xii+120 *pages.* 9*s*

This book is published for the purpose of illustrating Vols. V and VI of the Cambridge Ancient History, which chiefly centred round Greece in the fifth and fourth centuries B.C. It opens with a series of plates of coins. Specimens are shown of the coinages of Sicily, Asia Minor, Athens, Thebes, Boeotia, etc., Philip of Macedon and Alexander the Great. The selection is interesting as illustrative of historical events, as e.g. coins struck during the Satraps' revolt against Persia, by the Maritime, Arcadian and Achaean Leagues, a gold coin minted at Ephesus in 399 B.C. as pay for the remnant of "The Ten Thousand," and coins following on the break-up of Alexander's Empire.

Examples of Late Archaic and Early Classical sculpture and painting are then shown, followed by others of the second half of the fifth century. Fifth-century architecture is represented by the Temple at Posidonia, the Parthenon, Propylaea, the Erechtheum and the Doric Temple at Bassae. The fourth century is then treated in like manner, but the only example of architecture given is the Doric Temple of Athena Alea at Tegea in Arcadia, of which Scopas was the architect: its Corinthian capitals are illustrated and compared with others. The later phase of Egyptian Art which was dealt with by Dr. Hall in the History is illustrated by three plates showing Saïte and Ptolemaic portrait statues of the XXVIIIth and XXXth dynasties.

Reducing the size of this volume to so much smaller a compass than the first has no doubt made the question of selection a difficult one, especially when there was such a large amount of material to choose from. Opinions will probably differ as to whether the selection is the best that could have been made, as, for example, whether more prominence should not have been given to vase paintings. But considering the size and price of the book, subscribers to the Ancient History can hardly complain seriously. E. A. P.

CONTEMPORARIES OF MARCO POLO. Edited by MANUEL KOMROFF. *London: Jonathan Cape* 1928. 9×6 *inches;* xxiv+358 *pages.* 12*s* 6*d*

Mr. Komroff has had the excellent idea of supplementing his edition of Marco Polo for the general reader by collecting into one volume the narratives of other famous mediaeval travellers to the East. Plano Carpini, William of Rubruck, and Odoric of Pordenone were obvious candidates for inclusion; only Benjamin of Tudela seems a little out of place in this ecclesiastical company. The text of the first three is substantially a modernized reprint of Hakluyt's version, completed in the case of Friar William by a new translation from the French of de Bacher. Yule, Rockhill, and others have of course been laid under contribution. For Benjamin of Tudela Wright's revision of Asher's version has been adopted, with Adler's amendments. The annotations are confined to a few bracketed words in the text, and are naturally not always abreast of more modern research. Geographical identifications are often omitted, and as there are no maps, the reader is liable to find himself at a loss to know where he is. This deficiency apart, it is a notable gain to have these important travels made available for the first time to the large public who have no access to the publications of the Hakluyt Society. H. A. R. G.

THE MONTHLY RECORD

THE SEPTIMER TUNNEL PROJECT

A valuable discussion of the geological facts which might determine the feasibility of this project (intended to supply a new international link across the Alps in Eastern Switzerland) is given by Dr. R. Staub in the *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zurich*, 1928, 1 u. 2 Heft. Apart from its practical bearing on the scheme, it is of scientific interest in reference to the complicated geological structure of the region that would be crossed by the tunnel. Dr. Staub had previously executed a careful survey of this for the geological map of Switzerland, but made a more detailed examination in 1926 with a view to testing the possibilities of a tunnel, and comparing them with those offered by the rival schemes of the Splügen and Stelvio. The Septimer project would link the Overhalbstein valley on the north with the Val Bregaglia and Chiavenna on the south, but would traverse a region of unusually complicated structure, though this does not necessarily make it impossible to forecast the underground geology and hydrology. Dr. Staub points out whereas in some of the Alpine tunnels, notably the St. Gothard, the geology has been so simple as to permit a confident forecast of the underground conditions, and in others, *e.g.* the Simplon and Splügen, fairly trustworthy conclusions could be arrived at (in spite of the more irregular structure) through detailed study, in Eastern Switzerland the case is complicated by the great overthrust by which the original structure has been obliterated to a great extent, the overriding mass having torn the underlying strata into fragments which have been again piled up in complete disorder. This cannot fail to complicate the question enormously, yet Dr. Staub considers that his careful surveys permit general conclusions as to the distribution and nature of the rocks along the axis of the tunnel, the hydrological and temperature conditions, and so on. The result, in his view, is to show that the Septimer project is unlikely to meet with insurmountable obstacles, and that such difficulties as must no doubt be met with will be far less than in the case of the Splügen or the Stelvio. The hydrological conditions are in general simple, but the possibilities of flooding at certain points will require further study. The maximum temperatures likely to be encountered are from 30° to 35° C. as against 55° in the Splügen, and even these are to be expected over only 15 per cent. of the length. Dr. Staub makes some suggestions for a modification of the straight course originally laid down for the tunnel.

DURATION OF RIVER-ICE AND SNOW-COVER IN GERMANY

Attention may be drawn to two papers on cognate subjects, one by Dr. Gustav Schwalbe "Ueber Eisbildung und Eisabgang auf Flussen und über die Eisverhältnisse der deutschen Ströme und Flüsse, besonders innerhalb Norddeustchlands" (*Archiv der Deutschen Seewarte*, 44 Bd., 1927), the other by Erich Hebner, "Die Dauer der Schneedecke in Deutschland" (*Forschungen zur Deutschen Landes- und Volkskunde*, 26 Bd., Heft 2, 1928).

Germany, being crossed by the winter isotherm of 32° F., trending almost due north and south, occupies a transitional position between the more open winters of Western Europe and the freezing winters of Eastern, and the distributional figures illustrate very clearly the general increase from west to east of the number of days with both river-ice and snow-cover. Dr. Schwalbe's paper contains copious statistics of the number of days on which drift-ice and fast-ice ("Eisbewegung" and "Eisstand") occur at various points of all the important German rivers for the period between 1900 and 1917. Thus from the rivers of the extreme north-east—the Memel, Russ and Pregel—with an average total number of 104 ice-days and of 86 fast-ice days in the year, there is a

gradual diminution across the Vistula, Oder, Elbe, Weser and Ems to the Rhine with only thirteen and six days respectively. In the former region ice has been observed as early as November 6 and as late as April 13, the corresponding dates in the latter being November 11 and March 24. Whilst the number of ice-days on the different rivers and on different sections of the same river bears a very obvious relation to the mean winter temperature, minor irregularities are introduced by hydrological factors such as the rapidity of flow of the river and the condition of the tributaries.

Dr. Hebner's is an elaborate study with an excellent map, which makes one wish that similar maps were available for all the countries of Europe.

The figures expressing the "duration of snow-cover" are based upon the number of days in the year over the period 1900–14 when at least half the surrounding countryside is covered with snow at the place and hour of observation according to the International Meteorological Codex of 1907. In Germany at sea-level the average annual number is as low as 20 along the Dutch frontier, and as high as 100 on the Lithuanian and Polish; but the mountain regions everywhere introduce high figures, locally upwards of 150. Thus the dominant controlling factor in the duration of the snow-cover is decrease of temperature both upwards and eastwards in spite of the reduction of precipitation eastwards. The effect of latitude appears to play quite a minor part in Germany, apparently for a threefold reason: that the winter isotherms trend north and south; that the greater average elevation of the south of Germany counterbalances the lower latitude; and that, except on the western side of the country, the range of Germany in latitude is not great. The map shows minor irregularities connected with the location of tracts of country with respect to the windward or lee side of mountain ranges; with the occurrence of valleys subject to föhn winds which diminish the days of snow-cover; with cold-air mountain pockets which augment it; and with precipitation. There are also purely local factors affecting snow-cover, viz. slope, soil, cities, etc. It is noteworthy that the Harz in the extreme north, the Inn Valley in the extreme south, and the Sudeten in the extreme east of the German mountain region are the parts where the duration of snow-cover relatively to altitude is greatest, in the first and second cases on account of heavy precipitation, and in the third low temperature. At Klaustal at an altitude of 570 metres (about 1800 feet) in the Harz the average number of days with snow-cover is 110. The greatest known figure for Great Britain (where data are scanty) at an altitude not exceeding 1000 feet is 84 days, at Braemar, in the valley of the Aberdeenshire Dee (M.O. Book of Normals). Making allowance for the difference of altitude the figures for Klaustal and Braemar are of very much the same order, but the latitude of the Scottish station is, of course, a good deal higher.

SIR A. STEIN'S EXPLORATIONS IN S. BALUCHISTAN

Sir Aurel Stein by the close of November 1927 had completed the passing through the press of his 'Innermost Asia,' which furnishes the detailed record of the archaeological and geographical results of his third Central-Asian expedition. Its four quarto volumes have since been published by the Oxford University Press for the Government of India.

Once clear of this heavy task Sir Aurel started on a long tour on behalf of the Indian Archaeological Department through Kharan, Makran and Jhalawan, forming part of the Kalat State of Southern Baluchistan. It had been proposed by him in 1925, with the support of Sir John Marshall, Director-General of Archaeology in India. These territories, once included in the province *Gedrosia* of the ancient Persian Empire, are now for the most part arid wastes. The area

over which the explorations extended measures about 280 miles from east to west and some 250 miles from north to south. Without the very helpful assistance of the authorities of the Kalat State and the facilities of motor transport afforded by the fair-weather roads which have been opened in recent years, mainly under the aegis of Colonel T. H. Keyes, the late Political Agent, Kalat, it would have been impossible to survey ancient remains scattered over so great an area within four and a half months.

The classical records, especially those relating to the trials experienced by Alexander's army on his return from the conquests on the North-West Frontier and the Indus, clearly show that at that time the physical character, mainly desertic, of this region could not have differed very much from the present one. All the more remarkable is the great number of mounds marking prolonged occupation by ancient settlements of some size which Sir Aurel on his reconnaissance survey was able to trace and partially to explore. The experience gained on his tour of last year through Waziristan and Northern Baluchistan (*G.J.*, 71, 377–80) permitted him to determine by the evidence of plentiful remains of painted pottery, terracotta figurines, stone implements and the like, that most of those ancient settlements belonged to successive prehistoric periods extending from neolithic to chalcolithic times.

Trial excavations systematically carried out at more than half a dozen of the more promising sites brought to light much interesting evidence as to the conditions of daily life as well as to the burial customs prevailing at the different periods. Stone implements associated with remarkably well-made but undecorated ceramic ware were particularly abundant at the extensive site of Sukhtagen-dor near the Persian border of Makran. Complete chalcolithic burials unearthed on the very top of the Shahi tump mound near Turbat furnished plenty of painted funerary vessels, different in type from those found by Mr. Hargreaves at Nal, as well as personal relics of the dead. Painted ceramic ware of superior fabric and probably earlier type was found at certain other Makran mounds. It closely recalls that discovered by Sir Aurel Stein in Sistan and Zhob and is linked also with ceramic remains of certain sites in Persia and Transcaspia. At some mounds of Kolwa and Mashkai which in view of their size might well be considered as sites of small towns, the use of stone masonry had prevailed, and this facilitated the rapid exploration of ruined dwellings probably dating from about the third millennium before Christ, if not older. A peculiar feature of almost all the prehistoric sites is the abundance of a type of terracotta figurines which distinctly suggest the extension to the west of an Indian cult.

Extensive cemeteries explored on and near the Makran sea-coast may, on the other hand, not be far removed from the time when Alexander's fleet slowly made its way towards the Persian Gulf along these dreary shores of the Ikhthyophagoi, or "fish-eaters," the predecessors of the present fishing folk of the Meds. Of ruined sites occupied during Muhammadan times only few were traced, and those, too, only close to the present oases.

All the archaeological evidence obtained points to a comparatively well-developed civilization and one based upon ample agricultural resources having prevailed during prehistotic times in this wide region. The striking contrast with present conditions thus revealed in these arid tracts, with their scanty and semi-nomadic population, is bound to prove of special interest to geographical students in view of the much-discussed problem of "desiccation."

LAKES MANASAROWAR AND RAKAS

Soon after the publication of Mr. Ruttledge's and Col.-Commdt. Wilson's papers in the *Journal* for May 1928 Col. C. H. D. Ryder wrote pointing out an

omission in these papers. The letter was referred to Mr. Ruttledge, who replied regretting the oversight, due to want of a library at Almora. By an accident the note, which should have been published in September, has been delayed until now.

Mr. Ruttledge, though referring to the visit of Dr. Longstaff and Mr. C. A. Sherring in 1905, does not mention the work of the Tibet Frontier Commission in the previous year; more particularly Dr. Longstaff and Col.-Commdt. Wilson, in discussing the problem of Lakes Manasarowar and Rakas, make no reference to the observations of their predecessors. The expedition was described by Col. Ryder in the *Geographical Journal* for October 1905: his paper was accompanied by photographs of Manasarowar and the channel to Rakas, and by a folding map, the work of Col. Wood, Col. Ryder and Ram Singh. The map shows a stream from Manasarowar to Rakas and an "old channel" from Rakas to the Sutlej. An account of the expedition was also given by General Rawling in his book 'On the Great Plateau.' The following extracts from Col. Ryder's paper are given for comparison with the more recent accounts: "We struck the channel a mile below the outlet, a small stream only partly frozen over: this we followed up, and found that it did not flow from the lake, but from a hot spring. . . . We then followed up the dry nullah to the lake [Manasarowar]. . . . No water was flowing at this time of the year, but the local Tibetans all agreed that for some months in each year there was a flow during the rainy season and the melting of the snows, i.e. about from June to September. As a rise of about 2 feet in the level of the lake would cause water to flow down the channel [i.e. to Rakas] this appears quite worthy of belief. The length of the channel is about 3 miles." About the effluent from Rakas towards the Sutlej: "We found an old stream-bed issuing from the Rakas Tal, but every Tibetan we asked told the same story—that no water ever flowed along it now, but that in days gone by, one man saying before the Sikh war, water did flow out of the lake and down this channel. We followed it down for some 6 miles along the plain, and could find none of the ordinary signs that water flowed down it until we reached some low hills; here evidently, from the lie of the sand, water flowed at some time of the year, and away from the lakes."

It will be seen that on most points this account is confirmed by Dr. Longstaff and Mr. Sherring, who visited the lakes a few months later, and by Col.-Commdt. Wilson, who was there in 1926. They agree that a rise of about 2 feet in the level of Manasarowar would be sufficient to cause the stream to flow again: that the channel is fed to some extent by feeders or springs in its bed: and, with the exception of Mr. Sherring, that local information was that water normally flowed down the channel between June and September. Mr. Sherring reported that "after heavy rains the water traverses the channel. The last occasion was eleven years ago [i.e. 1894], when exceptional rain fell, and there were floods accompanied by great loss of life to cattle" ('Western Tibet,' p. 272). The evidence in general would appear to show that it flowed annually, but, it may be noted, that since Henry Strachey reported in 1846 a stream 3 feet deep connecting the lakes, apparently no traveller, with the exception of Richard Strachey in 1849, has seen this stream flowing, in accord with native report.

Regarding the effluent from Rakas to the Sutlej also, Col. Ryder's observations are borne out by later travellers.

THE DELTA OF THE YANGTZE

In the *China Journal* for June and August 1928 Dr. George P. Cressey, of the Department of Geology, Shanghai College, has an interesting study of the geology of the neighbourhood of Shanghai, which naturally deals largely with

the history of the formation of the Yangtze delta, as the ground on which the city stands is mainly the product of sedimentation. The amount of silt and other suspended matter carried by the Yangtze is enormous, and the long-continued observations of the Yangtze River Commission and of the Whangpoo Conservancy Board permit the yearly quantity to be roughly estimated at 400,000,000 tons. This takes no account of the material rolled along the bottom or the chemical load in solution, and if these are estimated on the basis of their proportion to the suspended matter in the case of the Mississippi we have to add over 200,000,000 tons to the former figure, the total being the equivalent of a ton and a half yearly for each inhabitant of China. The present load is however not a reliable guide to the river's work in the past, for before the spread of cultivation and the resulting destruction of forests, erosion of the land surface would be much slower. With the deposition of sediment the delta has probably been steadily sinking, and as a result of well-borings it is reckoned that the thickness of the sediments averages over 1000 feet. As therefore the area subject to deposition is about 25,000 square miles, the volume of the whole is at least 5000 cubic miles. Had the rate of deposition been always the same this would have required 60,000 years, but this must really be far too small a time, and the earliest sediments may date back into the Tertiary. The present-day seaward advance of the delta has been reckoned at about 1 mile in sixty years, but this estimate takes no account of the material rolled along the bottom nor the influence of sinking. The flatness of the delta is relieved here and there by isolated hills of rock of various composition, mostly representing Palaeozoic sediments intruded by igneous rocks during the Mesozoic, and comparable to the hills which form the Chusan islands. Beneath the delta sediments there is no doubt an ancient topography of hills and valleys. Dr. Cressey gives a detailed analysis of the varying composition of the sediments bored through in the making of the Shanghai waterworks well, which has a depth of 920 feet, and gives a comparative diagram showing the results of other borings. On the basis of these he attempts a reconstruction of the past geologic history of the Shanghai area.

THE CLIMATE OF FRENCH INDO-CHINA

Attention may be called to a paper on the climate of French Indo-China, by P. Carter, in the *Bulletin Economique de l'Indochine* (Année 31e, 1928, No. 192). The region has a mean annual temperature varying according to part between 75° and 80° F., with a decided seasonal variation only in the north. In Laos, which is shut off from marine influence by the Annam Mountains and from strong northerly winds by the Tongking Mountains, the climate is more continental than elsewhere, and the extremes of temperature have ranged from a maximum of 113° F. to a minimum of 33° F. As in Siam the heat, though constant, is not so severe as in a great part of India. The rainy season is that of the south-west monsoon between May and October. The amount of rain is governed largely by the relief of the land. In the Val d'Emeraude, in Cambodia, there are about 250 inches a year falling on 225 days, but such figures are exceptional, and at the other extreme we find Padarang in Annam receiving only 30 inches on 80 days.

In the delta region of the Tongking a period of light rains and mists known as the "crachin" interrupts the dry season in January and February at the time of minimum temperature. Hail squals are common in the vicinity of the mountains, but snowfalls are rare even on the highest mountains to the north of the peninsula, a feature due not so much to absence of cold as to dryness during the cold season. No genuine case of snowfall at sea-level is on record.

The country suffers both from typhoons and thunderstorms. The typhoons, which occur between June and September, are often very violent and bring torrents of rain, especially in the mountains. Thunderstorms occur, on an average, on 153 days in the year in the Tongking delta, and on 28 out of the 31 days of July. It is considered that such a high frequency of thunderstorms is of agricultural importance on the principle that atmospheric electricity causes oxygen and nitrogen to combine, forming an acid which is brought down with the rain to form soluble salts in the soil. It is further stated that thunderstorm rain-water has been found radio-active, which may further augment its economic value.

THE PORT OF JIBUTI

The increasing traffic of the port of Jibuti in French Somaliland is taxing the accommodation at present available, and a scheme drawn up for the extension of the works is detailed by M. Georges Joutel in *Renseignements Coloniaux*, October 1928. Jibuti serves as a port of call only for the great Oriental liners, which are supplied by lighters in the sheltered roadstead, so that there is no question of providing accommodation for such vessels. At present, however, the lighters can approach the quays at high water only, which is a cause of considerable delay and loss. It is therefore proposed to develop a project inaugurated some twenty years ago, a port at the end of Marabout Point. This will be accessible at all states of the tide, affords sufficient space for warehouses, and is in communication with the railway. At the same time, much of the port's traffic depends upon the coastal steamers of the Red Sea, which discharge all their cargoes at Jibuti: consequently quays would permit easier handling. Two basins are therefore to be built giving complete protection from the elements, and with increased traffic facilities. The cost of this work is estimated to exceed ten million francs, and will be borne by the finances of the Colony. The improvement of aids to navigation is also to be carried out. Tanks are also to be established for the replenishment of oil-driven vessels.

During the year 1926, 1423 vessels, with a total tonnage of 1·145 million tons, entered the port. Its prosperity depends upon the railway uniting it to Addis Ababa and the resulting transit traffic. This exceeded in 1926 1 milliard francs. It is notable that four-fifths of these imports and exports arrived from or were destined for countries other than France or her colonies. The article concludes by emphasizing its strategic importance, as controlling the straits of Bab-el-Mandeb.

VOLCANIC HISTORY OF LASSEN PEAK

Lassen Peak, California, has come in for much notice from the fact that it, alone of all volcanic mountains in the United States, has maintained its activity down to our own times, eruptions having taken place so recently as in 1914–15. The probable history of the peak from this point of view was sketched by Dr. J. S. Diller in 1916 in a paper noticed in the *Journal* in the same year (vol. 48, p. 173). Conclusions as to the nature and results of a former eruption are put forward by Mr. Howel Williams in the *University of California Publications* (*Bull. Dept. Geol. Sci.*), vol. 17, No. 7, 1928, and are of some interest from the unusual type of volcanic flow which the writer considers to have taken place, basing his view on careful examination of the present surface features. (He entitles the paper, "A recent volcanic Eruption," but here recent is to be understood relatively, for the event is placed about 200 years ago.) The special features described occupy an area to the north of Lassen Peak itself, and consist (1) of a dense cluster of rugged peaks and piles of loose blocks attaining a height of 8545 feet, and (2) a barren wilderness, at a lower level, consisting of a confused

jumble of angular dacite boulders. These two features are known respectively as the "Chaos Crags" and "Chaos Jumbles." Mr. Williams interprets these features thus: A series of pyroclastic eruptions from craters near the base of Lassen Peak was followed by the protrusion of more or less solid lava, forming bosses ("spines") now represented by the Chaos Crags, the loose angular blocks of which seem to be due to the shattering of a solid mass by pressure from beneath. This stage was probably followed by explosions by which coarse angular *ejecta* were hurled on to the earlier fine tuffs, these being converted into mud by the condensation of steam into rain. The consequent undermining and collapse of the northern "spine" is thought to have resulted in a great avalanche of coarse débris, the progress of which combined many of the features of dry rock streams with those of true mud-flows, the chaotic mass of the "Jumbles" being the result. A striking feature of these is the sharpness of their boundaries, indicating that the material must have been in the main of a dry solid nature. The suggestion that these events happened not more than 200 years ago is based on the former existence of tree-stumps in the lake formed by the damming action of the Jumbles deposit, the fresh appearance of the rocks, and the paucity of vegetation thereon.

MAPS OF NORTHERN SPITSBERGEN

A pamphlet entitled 'To the Rescue of the Nobile Expedition,' by Baron Gerard de Geer, dated June 1928, and kindly sent us by the author, opens with a section "On the Maps of Northern Spitsbergen," in which complaint is made that though " the greatest part of the north coast of Spitsbergen has been mapped out in detail by the Swedish Arc Measurement Expeditions of 1899–1902," yet "it is very remarkable that all sea charts at hand have neglected to introduce these newer measurements, though copies have been sent over to the institutions concerned." This comment is a little misleading. Though the field work was done in 1899–1902 the results of the Swedish Mission are far from being completely published in 1929. The topographical section (Tome II. IX[e] section including the excellent maps referred to by Baron de Geer) bears date 1923, but was not widely distributed for several years after. On 26 January 1926 our library, having heard of the work but not having received it, purchased a copy from its foreign bookseller, and by a curious coincidence received on the same day from an ex-President of the Society a copy which had been addressed to him personally. Lastly, a third copy addressed to the Society by the author was received on 25 August last. There has therefore not been so much delay in utilizing the valuable work of the Swedish Mission as is implied in the passage quoted.

THE ORIGIN OF COAST BARS

A careful and judicious discussion of the vexed question of the origin of coastal bars (known in Germany as *Nehrungen*), a feature found on long stretches of coast in many parts of the world, both in high and low latitudes, has lately been contributed to the *Geographische Zeitschrift* (1928, No. 5) by Dr. Max Hannemann of Frankfurt-on-Main. This writer shows a wide acquaintance with the previous literature on the question, and subjects the conflicting opinions hitherto put forward to a searching criticism. The most detailed previous discussion of the problem has been due to Major D. W. Johnson, in his important works on shore-processes in general and on the case of the New England Coast—where such shore bars reach perhaps their maximum development—in particular. Following the lead of W. M. Davis, Johnson upheld the view, first elaborated so far back as 1845 by Elie de Beaumont, that the bars owed their origin to wave action, piling up material derived from the sea-floor. An

older view which had met with wide acceptance was that of G. K. Gilbert, which called in the action of long-shore currents transporting the material derived from coast-erosion in a direction parallel to the shore, and depositing it in positions where the force of the current was lessened. That such action operates to a certain extent, especially on coasts with an alternation of bays and projecting headlands, is acknowledged by all, but its general applicability is denied by the American school. Johnson based his conclusions chiefly on a number of profiles taken at right angles to the coasts studied, which, he thought, proved that in the great majority of cases there had been erosion of the sea-floor outside the bars. Dr. Hannemann considers that the number of profiles is insufficient to justify definite conclusions, and gives other reasons for doubting the American explanation. He questions in particular the power of wave-action to pile up material *above* sea-level at a distance from the shore, and points to the wide interval which often separates the bars from the coast-line as a special difficulty, since the bars in such cases must have originated well outside the zone of effective wave-action. In regard to the lateral-displacement theory, for which he shows an evident preference, Dr. Hannemann enters into a careful analysis of the way in which such action would take place, previous advocates of this view having been generally content with more general statements. He considers in turn the principal objections which have been raised and thinks that they can be shown to be without force. A third theory, which explains the phenomenon as due to subsidence, flooding a former coastal lowland and leaving an old line of dunes as a narrow spit of land on the seaward side, deserves consideration, but the evidence for such widespread subsidence is not yet forthcoming, and the existing data on the whole question are, Dr. Hannemann thinks, insufficient to justify positive conclusions.

INTERNATIONAL GEOGRAPHICAL UNION

Following on the recent meeting of the International Geographical Congress at Cambridge in July last, the executive of the International Geographical Union (under whose auspices the Congress was organized) issued with commendable promptitude during the autumn a report for the period 1 January 1927 to 1 September 1928, thus covering the actual meeting of the Congress and putting on record its main results as embodied in the decisions of the General Assembly of the Union at its meeting on July 25. At this meeting General R. Bourgeois was unanimously elected President of the Union for the ensuing period, Dr. Filippo de Filippi becoming General Secretary in succession to Sir Charles Close. The report also includes a statement of the position of the Union, general and financial, in August last.

LIVERPOOL OBSERVATORY AND TIDAL INSTITUTE

On January 1 the Tidal Institute at the University of Liverpool and the Liverpool Observatory, Bidston, were amalgamated to form the Liverpool Observatory and Tidal Institute. It is controlled by a Joint Committee of the Mersey Docks and Harbour Board and of Liverpool University. Prof. J. Proudman, F.R.S., is the Director, with Dr. A. T. Doodson as Assistant-Director. This amalgamation should enable the valuable work done by both institutions in the past to be greatly extended. All communications concerning meteorological and geophysical observations, analyses, and predictions of tides, etc., should be addressed to The Director, The Observatory, Birkenhead.

OBITUARY

GENERAL SIR ARTHUR PAGET

We record with much regret the death of General Sir Arthur H. Paget, G.C.B., K.C.V.O., which took place on 9 December 1928. He had been a Fellow of the Society for thirty-five years, having joined in 1893, and was seventy-seven years old when he died. This is not the place to speak of his distinguished career as a soldier, but it may be recalled that he was a generous benefactor to the Society from his gift to its collections in 1920 of the great Blaeu Map (see *Journal*, vol. 55, p. 312), which forms a worthy counterpart to the Hondius map of 1608, the two being among the most striking objects now shown on the walls of the map-room.

MRS. ST. GEORGE LITTLEDALE

We much regret to record the death, on November 1 last, of Mrs. St. George Littledale, in her ninetieth year. Mrs. Littledale was a courageous traveller, accompanying her husband upon many of his journeys. After a preliminary visit to the Pamirs in 1888, they crossed the range from north to south two years later. The following year they made a notable journey in Central Asia, traversing much previously unexplored country on their route from Kokhan to Peking. Mrs. Littledale also was with her husband on his important journey over the Kunlun mountains and across Tibet from north to south, for which he received the Gold Medal of the Society in 1896. Shooting trips also took them to the Caucasus, Persia, Mongolia, the Rockies, and Alaska. Mr. Littledale has testified frequently to his wife's qualities as a traveller, and to the assistance she rendered him in his survey work.

MEETINGS: SESSION 1928–1929

Fifth Evening Meeting, 7 January 1929. The President in the Chair

Elections: Lieut. Henry Bagot, R.E.; Charles Booth; Ralph Stanley Goldie Brocklebank, B.A.; Miss Hilda May Gordon; U. J. Herrmann; Mrs. Florence Gwendoline Hooke; Martin MacLaughlin; Mrs. Mary Mainwaring; Edwyn E. Marshall; Parke Duncan Massey; Harold Miller; Leopold Hamilton Myers; Gregory M. Nachimson; The Hon. Mrs. George Northcote; Arthur George Shawcross; Capt. Harry Reginald Simpson; Mrs. Clare D. Stonehouse; George Bertram Swaine, B.A.; Miss Elsie White, B.SC.; Arthur E. Williams

Paper: The first crossing from the Fly River to the Sepik, New Guinea. Read by Mr. A. F. R. Wollaston in the absence of Mr. C. H. Karius

Third Afternoon Meeting, 14 January 1929. The President in the Chair

Paper: The Cambridge Pendulums for Gravity Survey. By Col. Sir Gerald Lenox-Conyngham

Sixth Evening Meeting, 21 January 1929. The President in the Chair

Elections: Percy Ainley; William Charles Bentall, O.B.E., F.R.C.S.; Arthur Melvill Close; James Hector Coombs; P. R. Foulkes-Roberts; Frederick George Leopold Heyes; John Neil Leitch, M.D., B.S., M.R.C.S., L.R.C.P.; Frank Hyde Maberly, M.D.; Ernest Cecil Marchant, M.A.; Sydney J. Milton; The Rev. William J. Murray, B.A.; Miss Sita Bai Jagoomal Narsian, B.A.; Miss Lachhi Bai Jagoomal Narsian, B.A.; Lady Ponsonby; Charles William Brinton Price; Sharat K. Roy, B.A., M.SC.; William George Royal; Percy Sands, M.A.; Iqbal Singh, B.SC.; Rev. Frederic Taylor, L.TH.; W. I. Tio; James Alexander Williamson

Paper: The Northern New Hebrides. By Mr. J. R. Baker

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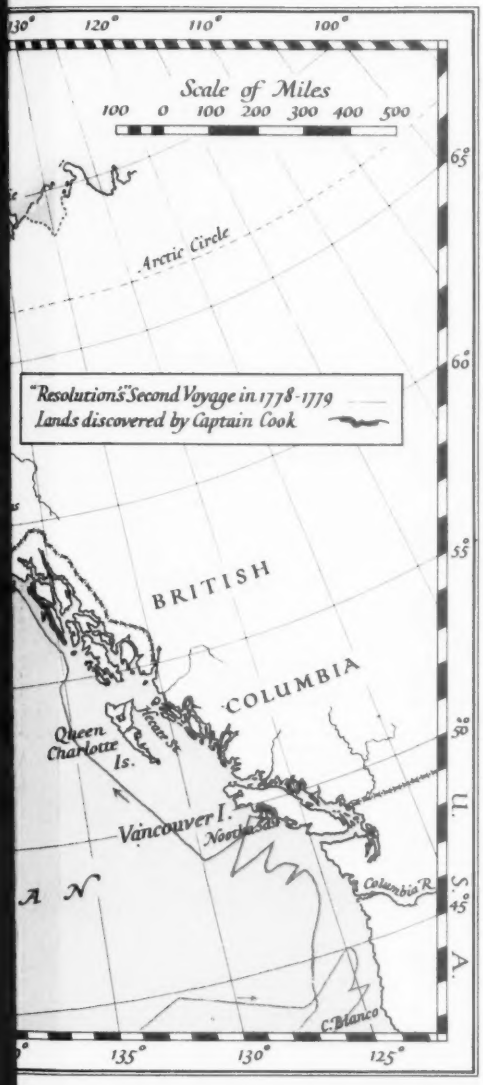
C. North
Point Barrow
Icy Cape
C. Disbursal
Mackenzie Bay
Anadyr R.
Onemen
Kolimuhin Bay
East Cape
Gulf of Anadyr
C. Tokukorski
St. Lawrence I.
Bering Strait
C. Pr. of Wales
Rodney Pt.
Norton Sd.
Bering Sea
Yukon
ALASKA
St. Matthew I.
C. Romanzoff
C. Newenham
Bristol Bay
Prince William Sound
Mt. St. Elias
C. Fairweather
Kodiak I.
Trinity Is.
Alaska Pen.
Aleutian Islands
Shumagin Is.
Unalaska I.
Umnak I.
PACIFIC OCEAN

"Endeavour's" track (176

"Resolution's" 1st. voyage (

CAPTAIN JAMES COOK'S VOYAGES AND



Published by the Royal Geo

AND DISCOVERIES IN THE PACIFIC OCEAN.

UNIV. OF MICH.

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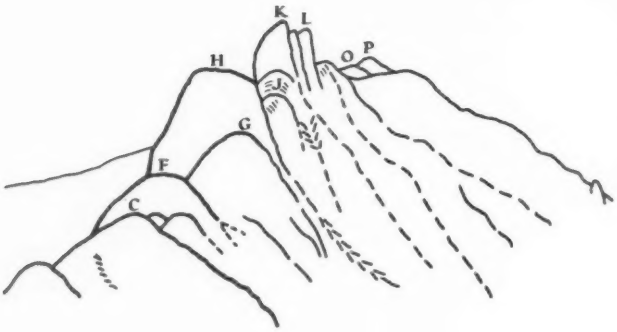
Cook's Voyages.



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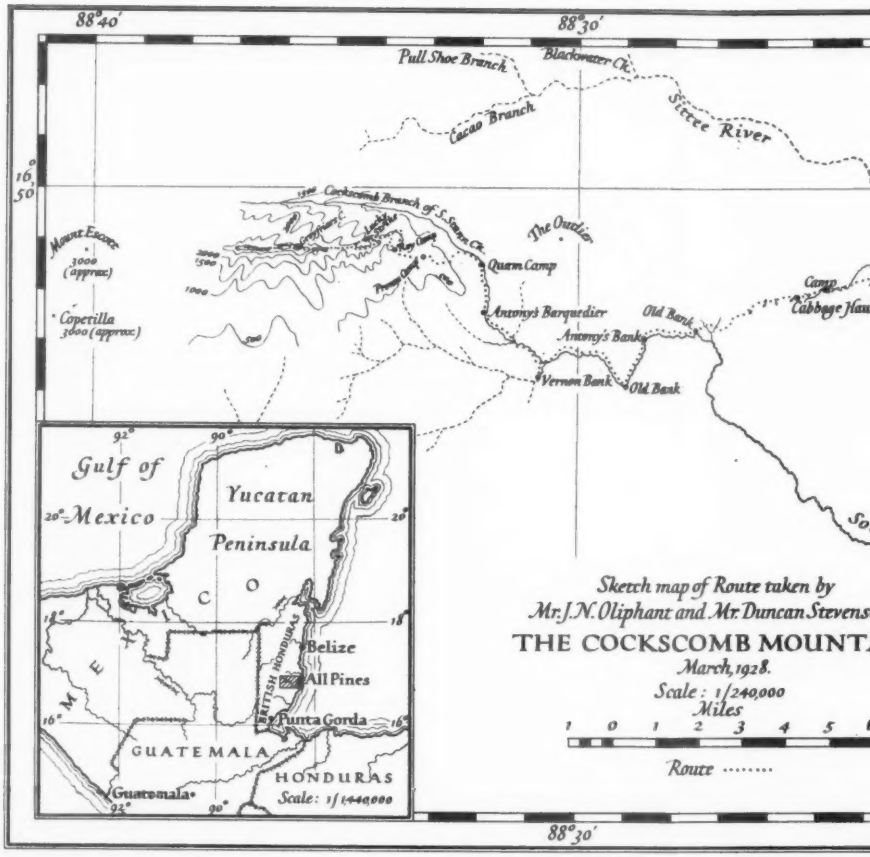

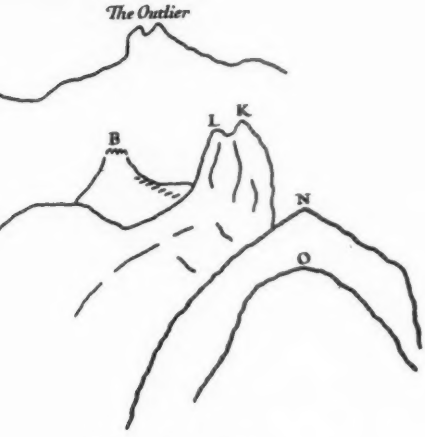

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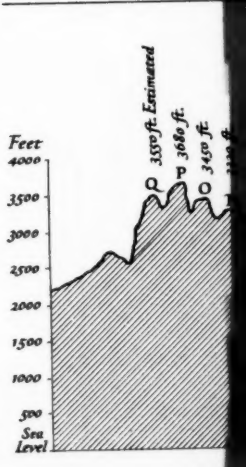

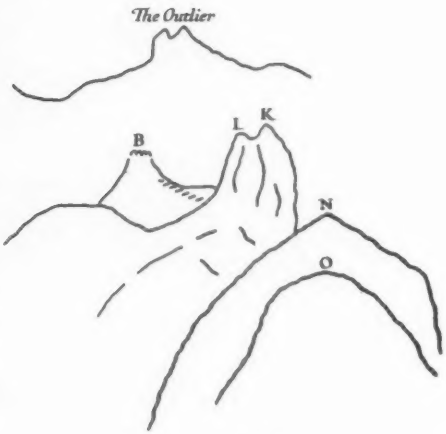

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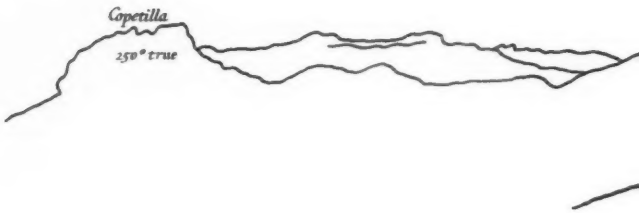

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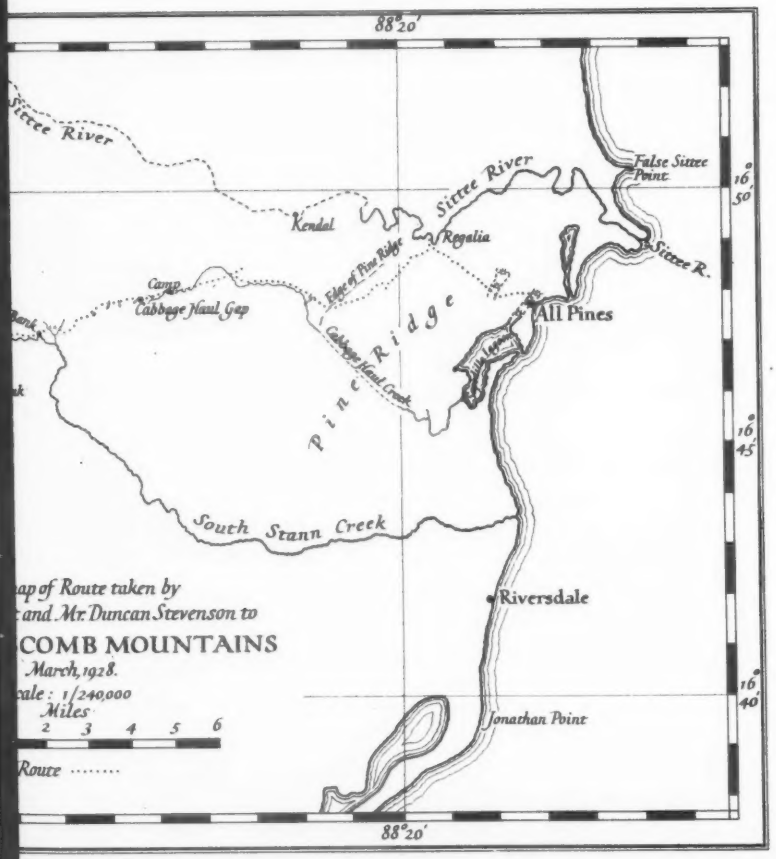

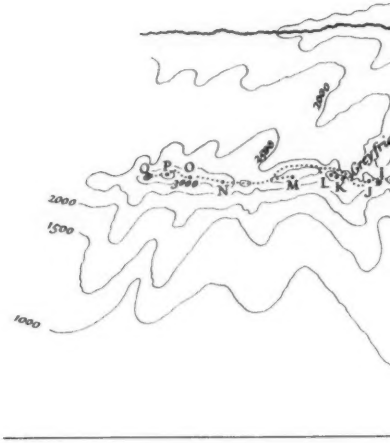

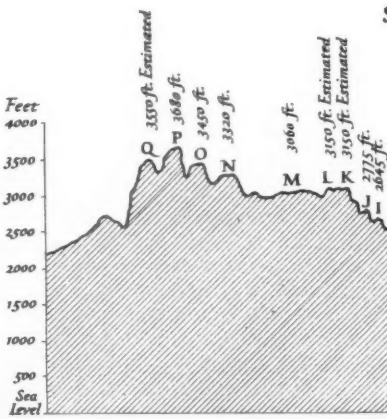

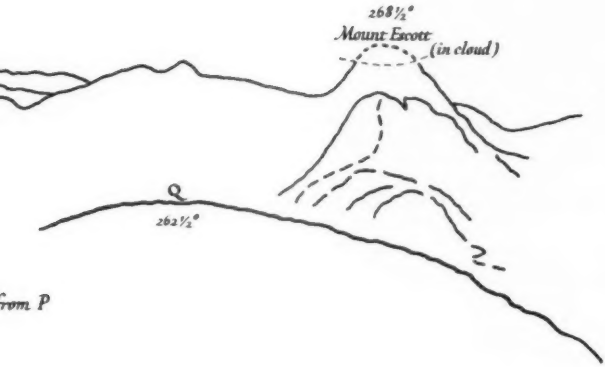

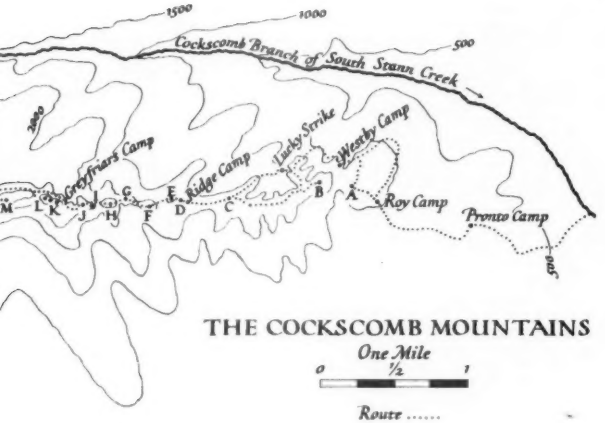

THE COCKSCOMB MOUNTAINS

One Mile

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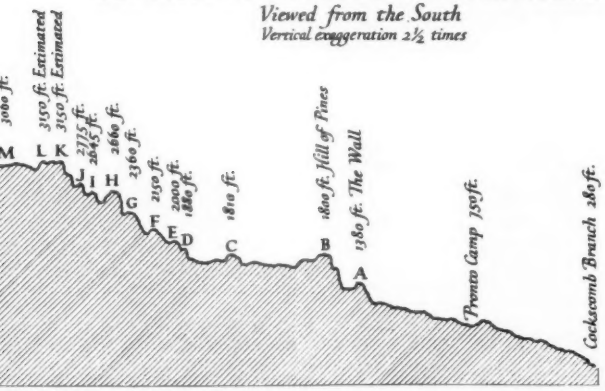
Route .....

SECTION OF COCKSCOMB MOUNTAINS

Viewed from the South

Vertical exaggeration 2½ times



COCKSCOMB MOUNTAINS

Oliphant and Stevenson